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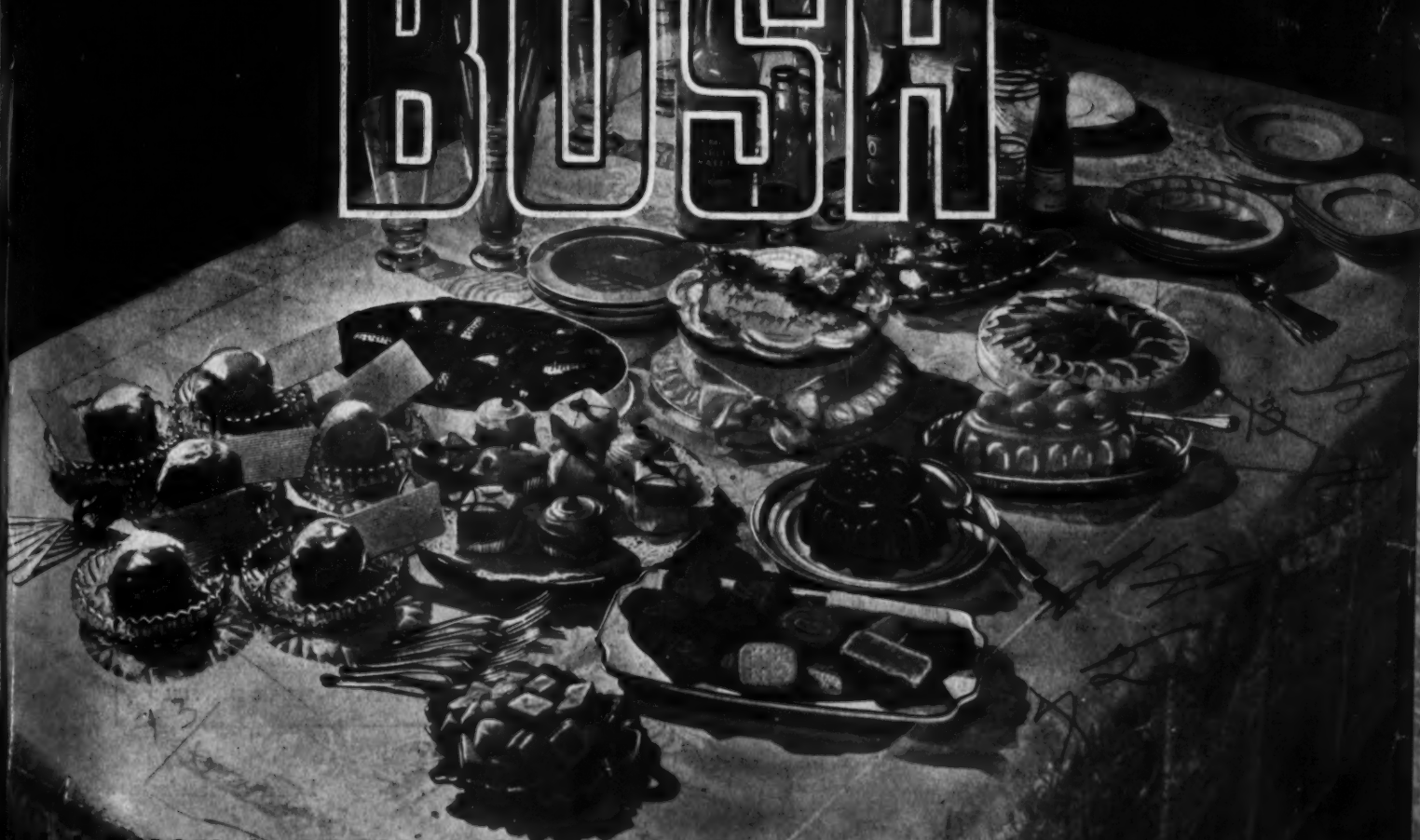

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FOOD MANUFACTURE

Vol. XIII, No. 6 June, 1938

Food Flavours

ALTHOUGH AT the present time the arts of flavouring and colouring of foods are closely intertwined, it is only the former which can boast of links with antiquity. It is probable that spices were the first flavouring materials used by man. Cassia, for example, was mentioned in Chinese herbals in 2700 B.C., and the use of cloves and pepper is recorded between 400 and 200 B.C., while the virtues of turmeric, ginger, cardamom, coriander and nutmeg were recognised in very early times.

Until the latter part of the nineteenth century, little effort was made to produce essences and concentrates from fruits, although confections of them are very ancient. The Aztecs used the vanilla bean as a flavouring for their chocolate, but it was only in the sixteenth century that it was used in Europe.

The modern tendency has been to present flavouring materials to the food manufacturer in concentrated form—often skilfully blended, as in the case of spice and herb oils for sausage making and the citrus oils for the baking industry. An interesting feature of the search for greater subtlety is the blending of oils and fruit concentrates with certain synthetics to give distinctive character to the article of food. Again, the development of "synthetics" has been extensive, and they have definitely taken their place in modern food production. The point arises whether this is really all a new thing. Mankind has probably always had a lickerish palate.

Mass production is taking the place of those simples and such-like made in the still-rooms of our great-grandmothers. There is nothing new under the sun.

—and Colours

Recently some trials were made whereby table jellies containing the same flavour but coloured differently were submitted to a large number of tasters. The reports received covered practically the entire range of the commoner fruits and almost without exception it was evident that the colour had been the deciding factor. The matter is not quite so simple as would appear from the results quoted. It is one for study by the experimental psychologist, probably a very useful man to have in the food industry. Secondary tendencies may be traced to many causes in the individual and the treatment of the subject of colour in foods must necessarily be on broad lines.

In general, a pleasant colour, appropriate to the particular article of food (although there are some curious exceptions where they are expected to be something quite different from the natural colour!), will suggestively act as a digestive stimulus.

It cannot be denied that there still exists a certain amount of prejudice on the part of the consumer against artificial colouring matters—mostly on æsthetic rather than scientific grounds. This prejudice is manifested when the colouring is badly done. Someone told us recently that the "green" of his spinach had stained the potatoes on his plate, to his entire disgust.

As regards the harmlessness of the permitted colours, this has been satisfactorily established by long research, and the food manufacturer is protected by the fact that all edible colours must be sold under guarantee.

The colour manufacturer, apart from his task of ensuring purity, is confronted with problems of many kinds. His colours must, according to the product in which they are destined to be used, resist high temperatures, the action of sulphur dioxide, carbon dioxide, and so on. They must be fast to light, and in the case of powdered products the added dye must be finely ground. Perhaps only the colour chemist himself can realise the amount of research necessary to cope with the requirements of the multitudinous products of the food producer.

In dealing with reputable dyestuffs manufacturers, the food man may, as has been suggested, confide in them to deliver the goods. But when he receives them, his job is not quite finished. Apart from the irreducible amount of care to be taken in the addition of colours to his goods, he has a large field of study in assessing, by various means at his disposal, the deeper psychological effects of such colours on his customers.

Frozen Foods

Not long ago our contemporary *Food Industries Weekly* told the story of Garden Fresh Foods, a firm which will pack fruit and vegetables in South Wales by the Haslacher process. It is also announced that Mr. Smedley has already arranged for the installation of cabinets on the premises of 250 key retailers, and that these will be ready by August, so that his 1938 season's pack (frozen by a special process) may be retailed next winter.

It is not generally known that the first "Z" process plant (invented by Mr. Zarctschenzeff) was erected at Grimsby in 1930, and that for the past eight years fish fillets have been frozen in 1 to 7 lb. cartons for distribution to hotels, restaurants and institutions. As our contemporary declares, "frozen foods are on the march."

An enterprising Sicilian firm has started freezing the juice of freshly picked lemons and is making arrangements to ship it (through London agents) to this country, as well as to the U.S.A. To those who know the difference between citrus fruit just picked from the tree and that bought at the greengrocer's, this product cannot fail to be of interest. The U.S.A. already does a large business in frozen lemon and other juices, which have partially replaced the sulphited and pasteurised ones.

Storage Policy

We welcomed, as presumably everyone else did, the announcement by Sir John Simon in his Budget speech that the Government had decided to buy stocks of wheat, sugar and oil in sufficient quantities to tide over a short initial period of emergency. This is a problem that has exercised our minds for a long time. In April, 1936, we published an article by Mr. T. H. Fairbrother entitled "Are We Prepared?" and we believe this was one of the first articles on the subject in this country. Since that time we have continually stressed the importance of adequate food supplies in case of war and the news that at last the Government has recognised the problem as one worthy of action is indeed welcome. Our satisfaction, however, is rather damped by the meagre provision. What has been done is negligible, a mere scratching of the surface, where deep trenching is needed. While we agree that the Government have done something to quieten their critics and given their supporters an assurance of good faith, to our mind they have skilfully evaded the issue and put a very thin coating of sugar on an extremely bitter pill. We have always maintained, and still believe, that the real problem of food supplies in times of emergency is that of storage. We must have the food here, ready for distribution, not on the high seas or rotting in some distant port awaiting a ship to transport it. All the commodities purchased could be stored for long periods given correct conditions, and they should be obtained and stored here. While we must render thanks to the Government for the few crumbs they have provided, we feel very much like Oliver Twist and plead for more.

Resolution

Politics and science were represented on the platform of a recent meeting of the Primrose League School of Politics at which Mr. E. Duncan Sandys, M.P., presided, when a resolution was passed that "Arrangements should be made to maintain for the most part in *dispersed inland storage*, the equivalent of nine months' supply of all essential foodstuffs". The resolution was proposed by Sir Arthur Salter, M.P., who in a trenchant speech pointed out the need for a continuous and immediate effort in providing for food storage.

Mr. W. P. Dreaper, Chairman of the Technical Committee of the League of Science, in seconding the resolution, gave some concrete figures on the amount of proteins which would be required for nine months, and further data are being collated to cover the whole range of essential foodstuffs. That the subject of food storage is exercising the minds of some sections of the general public was demonstrated by the fact that the Grand Committee Hall of the House of Commons, in which the meeting took place, was full to overflowing.

Home Production

The Government's announcement that they had purchased some wheat, sugar and oil, has brought forth the expected spate of clamours for more home production. In a leading article the *Farmer and Stockbreeder* said: "We trust, however, that storage will not be allowed to obscure the question of equal importance—the development of food production at home", and *The Times* pointed out that "the news that the Government had arranged for the storage of some supplies of imported wheat, sugar and oil as a measure of national defence has been received by farmers with mixed feelings. They ask whether home production is to be left out of food defence plans". We feel that this business of home production is being rather overdone. The British farmer is a very difficult man to please,

and always has something to grumble about despite all efforts made to improve his conditions. The British farmer is much better looked after than most in other countries, but he is not satisfied. When one considers what the Government has done on behalf of home agriculture one wonders as to the justification of the present critics. Wheat, meat and sugar have all been subsidised, and farmers encouraged to grow unprofitable crops at the nation's expense. Marketing boards have been set up at the request of and by the vote of the farmers. The fact that these have not proved an overwhelming success is not the Government's fault. They provided the machinery, but the farmers have proved incapable of using it. There is a limit to subsidies, and we cannot go on growing unprofitable crops indefinitely. Home production has not been overlooked; on the contrary it has been spoon-fed to a considerable degree. We hope that the Government will neither neglect it nor subsidise it extravagantly. It is a case once more of *modus in rebus*.

Reinforced Flour

In the recent issue of *Cereal Chemistry*, Aitken and Geddes have contributed a paper on "The Effect on Flour Strength of Increasing the Protein Content by Addition of Dried Gluten". This opens up many interesting possibilities. By using a low drying temperature of 32 deg. C. and a rapid current of air, dry gluten is prepared which, after reducing to flour-like fineness, yields wet gluten closely resembling freshly prepared wet gluten from corresponding flours in the major physical properties as indicated by hand manipulation. There is, however, evidence that the degree of dispersion in dilute acetic acid is lowered as a result of drying. Dried glutens, prepared from experimentally milled flours representing weak, intermediate and strong wheats, when added to the corresponding flours to equalise their protein contents (to 13·8 per cent.) resulted in decided improvement in flour strength, as indicated by absorption, dough handling quality, loaf volume, loaf appearance and type of farinogram. This study indicated that certain flours—*e.g.*, those from Yeoman, Australian, Argentine, Russian, Hungarian, Canadian frosted and Garnet wheats—differ in baking quality chiefly on account of variations in protein content, and that protein character is of lesser importance. With these, protein content is a satisfactory indication of strength. On the other hand, with flours milled from weak wheats—*e.g.*, English, German and Italian—and also from very strong types—*e.g.*, 1 and 2 Manitobas—definite differences in protein character were evidenced. The weakest types are weak not only because of low protein, but also because of the inferior character of the gluten. While increasing the protein content of weak flours by the addition of their own dried gluten resulted in marked improvement, the addition of strong gluten produced even more beneficial effects. Thus weak flours like normal English were improved beyond recognition by the addition of Manitoba gluten. The strength imparting properties of dried gluten are not impaired after ten months' storage.

Nutritive Value of Bread

A recent paper by B. W. Fairbanks of the Division of Animal Nutrition at Illinois can aptly be described as killing two birds with one stone. In it the improved nutritive value of bread brought about by the addition of dry milk solids is considered as a means of augmenting milk consumption. After reviewing previous work on the nutritional value of bread and milk starting with the recommendation by Sherman and Hawley fifteen years ago of a quart of milk per child per day, Fairbanks describes the results of feeding rats *ad libitum* with three different kinds of bread. These indicate that the addition of milk solids to a water bread (no milk) formula increases the nutritive value of the bread. There is evidence that the nutritive value of bread containing 12 per cent. milk solids is of a higher order than bread containing 6 per cent. milk solids. Most nutritionists agree that the present consumption of liquid milk should be maintained and that efforts should be continued to increase it. The *per capita* consumption is less than that recommended by nutrition experts. Fairbanks suggests that the addition of milk solids to bread is an excellent method of augmenting milk consumption. While the use of dry milk solids has its advantages as to transport and storage, there is no reason why the dough should not be made with milk instead of water if a handy supply of liquid milk is available.

An Important Decision

Every manufacturer and every retailer of foodstuffs would do well to note the recent decision in Square *v.* Model Farm Dairies (Bournemouth), Ltd., where a dairy was held responsible to persons who had consumed infected milk supplied by the dairy, and had contracted typhoid in consequence. The importance of this decision lies in

the fact that it considerably extends the scope of the liability of persons who supply contaminated food, since the plaintiffs in the case were not persons who had purchased the milk from the dairy, and accordingly had not entered into any contractual relationship with the latter.

As far as the purchaser is concerned, the seller of contaminated food will incur a liability for breach of warranty under S. 14 of the Sale of Goods Act, 1893. The liability in such a case is practically absolute since, however great the precautions that the seller may have taken against contamination, the liability will still exist. The fact that every reasonable safeguard by examination, inspection or otherwise had been taken will afford no excuse. It is a principle of the Law, however, that persons who are not parties to a contract are not entitled to take advantage of any breach of the contract. Consumers of foodstuffs, accordingly, who have not purchased direct, may in such cases be without a remedy. The seller is under no contractual liability to them. But there are two important exceptions to non-liability. A person who provides foodstuffs may be made liable to members of the public who consume such foodstuffs to their detriment either on the ground of negligence or else on the ground of breach of statutory duty.

Liability in Tort

The first ground of liability—viz., negligence—may be regarded as having been firmly established by the decision of the House of Lords in Donoghue *v.* Stevenson, where a manufacturer was held to be liable to a member of the public who had consumed ginger beer which had been contaminated by the presence of a dead snail in the bottle. The manufacturer, however, is not to be treated as an insurer, and he can only be made liable if negligence is affirmatively proved against him. The principle of this decision applies in particular, if not exclusively, to cases where the manufacturer places an article of food on the market, in such a form—*e.g.*, by bottling—so as to exclude interference with and examination of the article by any intermediate handler of the goods between himself and the consumer. But the Square case indicates a new and further ground of liability—viz., breach of statutory duty. Under S. 2 of the Food and Drugs (Adulteration) Act, 1928, it is an offence for a person to "sell to the prejudice of the purchaser any article of food which is not of the nature or not of the substance, or not of the quality of the article demanded by the purchaser." This provision accordingly creates a statutory duty, which is for the benefit not merely of the person directly purchasing, but also of every person such as members of the household, guests, etc., consuming the article of food supplied to the purchaser. It is not of course every breach of statutory duty which confers on the person for whose benefit the duty has been imposed the right to recover damages in a civil action. The remedy for the breach is usually confined to the penalty imposed by the Statute.

But according to the Square case, a breach of the statutory duty imposed by S. 2 of the Food and Drugs (Adulteration) Act, 1928, constitutes one of those cases in which a right to recover damages is vested in the person who suffers in consequence of the breach. Negligence does not enter into the question in such cases, and the liability imposed is absolute.

Ascorbic Acid

In 1935 Jørgenson wrote a paper dealing with a new conception of the rôle played by potassium bromate and similar substances in panary fermentation, and in it he stated that ascorbic acid could act as a bread improver. This led Melville and Shattock, of the Wheat Research Institute, New Zealand, to carry out further experiments. In countries such as New Zealand, where the addition of bromate to flour is illegal, Jørgenson's discovery is of considerable potential importance as there are many occasions when the flour from certain areas or in certain seasons would benefit by the addition of an improver. Melville and Shattock, in investigating the utility of lemon juice, one of the cheapest and richest natural sources of ascorbic acid, noticed that the improving action did not decrease (as the ready oxidisability of the acid suggests) on storing for six months. It seems rather a paradox that while the usual improvers such as bromate, persulphate or chlorine are all strong oxidising agents, ascorbic acid is a moderately strong reducing agent. The authors have proved that dehydroascorbic acid is a bread improver, equivalent to bromate on a weight for weight basis. On flours requiring relatively large quantities of bromate, dehydroascorbic acid is more potent than ascorbic acid. This, together with the fact that flour contains an enzyme, ascorbic acid oxidase, capable of catalysing the oxidation of ascorbic acid to dehydroascorbic acid, leads to the hypothesis that ascorbic acid *per se* is inactive and that the improving action is due entirely to its oxidation product.

THE COLOUR AND FLAVOUR OF PACKED FOODS

G. Malcolm Dyson, Ph.D., F.I.C.

IN THE development of bulk-produced and factory-packed foodstuffs, it is often contended that flavour and zest are, to some extent, lost. This may, perhaps, explain part of the preference of "home-made" articles of food and drink by a large section of the public, and it is the purpose of this article to explore the possibilities of this alleged loss and to discuss methods by which it may be minimised or eliminated.

Packaging

The first appeal of any packed foodstuff is to the eye and it is not yet sufficiently realised that one of the major appeals of a pack lies in its appearance of neatness, freshness and colour. Food packers have yet to take a leaf from the book of their perfumery and cosmetic colleagues and produce really attractive packages. It is not sufficient, for example, to print a glaring label, indicating tomatoes of a shape, size and colour that Nature would shudder to produce; something more subtle is needed and something which will make its appeal to the rapidly increasing fastidiousness of the majority of purchasers. This point will be dealt with more fully later, since it is not intended to devote this article to packaging, but to the colour and flavour of the articles themselves. However, before leaving the question of packaging, two points of great importance should be stressed:

(*a*) The choice between an opaque and a transparent pack, the latter displaying the goods, either with or without a transparent cellulose wrapping.
(*b*) The question of the action of light on packs in which the transparent wrapping is used.

The first of these two problems is partly to be decided by the nature of the material packed—some lines, such as yeast and meat extracts, are of unpleasant appearance and a porcelain or dark brown glass pack is essential. Where a transparent pack is used, it should be ascertained that there is no danger of fading.

Fading

While a very satisfactory range of foodstuffs colours can be obtained from the various firms which specialise in these materials, neither these dyes nor the natural colours which they are designed to imitate are fast to light; some are more fugitive than others and for preserve and confectionery colouring where, by reason of a transparent pack or other cause, it is anticipated that fading may take place, sample batches should be made up with various dyes and tested out by means of the Fugitometer. This instrument causes the fading of samples by ultra-violet irradiation from a powerful lamp under controlled conditions of humidity, temperature and illumination. The degree of fading may be judged by the eye, but, in my own laboratories, we have found it expedient to eliminate the human element in colour comparisons by use of a Bolton and Williams photo-electric colorimeter. Samples after undergoing the fading test are measured with the colorimeter and the length of exposure required to produce a definite alteration in the peak of the absorption curve is measured. This is shown in the figure (p. 187), where the solid curve represents the absorption of a sample of greengage jelly as supplied; the broken curves II and III show the colour after six and eighteen hours' exposure in the Fugitometer.

The determination of colour only takes the expert worker a few minutes to carry out and avoids the use of the eye for comparisons.

The sample of jelly referred to was part of a consignment wrapped in transparent cellophane, and complaints had been received that the preserve had faded during exposure on the counters of a multiple store. In this case colour is of paramount importance, since greengage jelly is mainly used for purposes of decoration. It may be of interest to add that the difficulty was met by wrapping in a yellow-dyed cellophane wrapper which kept back a considerable portion of the active light.

Artificial Colours

There is no doubt that the use of artificial colours in the preparation of food and drink must be governed by the two words "accuracy" and "discretion". Accuracy in matching the conventionally accepted standard of colour, and discretion in using as little colouring matter as possible, consistent with obtaining the correct appearance.

In many cases there seems to be a curious unwritten agreement among consumers as to the accepted shades

of colour in foods; the reds of raspberry and strawberry jellies, for example, must match the conventional shade —and not that of the fruit itself—in order to become popular.

The use of green colours should be carefully considered; there still remains a large body of prejudice against artificially green-coloured food products when met in unconventional circumstances. This is particularly so in the province of marmalades (especially lime) and mineral water drinks; one cannot imagine a really popular mineral drink coloured bright green, yet in the case of liqueurs where the colour is expected, it appears to be permissible.

Flavour

The sensation termed flavour is a complex one and depends on numerous physiological and psychological factors operating together. In the first place, both taste (sapidity) and smell (aroma) are involved, together with tactile and thermal sensations. The latter point is sometimes entirely overlooked and often insufficiently considered in the production of manufactured foods.

The tactile sense of the mouth is very highly developed as a defence mechanism for the rejection of material unsuitable for the alimentary tract, and even if the taste and odour of a preparation is exquisite, very little æsthetic appreciation is experienced unless the tactile nerve mechanism is first satisfied.

The tactile sense may be regarded as assaying the mechanical properties of the material tasted, and unless these mechanical qualities are satisfactory, most of the other properties go unperceived. A jam which has been boiled too hard, a jelly made with excess of gelatine—even an egg overboiled lose much of their appeal through loss of "texture" due, in this case, to excess mechanical strength. The converse also holds—there is no real flavour difference between a jelly which has set and one which has not, but their tactile appeal is very different.

Another factor which contributes to tactile appeal is grain or particle size. Grain size is of paramount importance in ice-cream, where the smoothness of the preparation is closely related to the grain size (*i.e.*, of the actual ice crystals). This aspect of texture is very important also in honey, where the growth of small crystals which are suspended in liquid matrix is pleasant and desirable, while the growth of larger crystals gives a "gritty" or unpleasant tactile sensation. Here, too, comes one of the æsthetic objections to the use of apple pulp and certain pectin preparations in the setting of jams; a sensitive palate can detect their use—not by alteration in aroma or sapidity, but by alteration in the mechanical properties. It can be shown experimentally in the laboratory that a substantial difference exists between the thixotropy of pectinated and pectin-free gels, and this difference is readily detected by the palate. As might readily be expected, this factor is particularly apparent in the cheaper grades of strawberry jams.

Pie Jelly

Yet another example is the use of artificial "pie-jelly" in the meat pie trade, although in this case the effect is aggravated by an absence of sapidity. In the original recipes for pork and allied pies, the meat was stripped from the bone, seasoned and encased in crust and baked; the bones were cooked with water and seasonings and the stock so obtained was poured into the pies after baking; when properly prepared the stock jellied. There is no doubt that the "succulence" of a well-made meat pie depends on this final process. To-day, with the enormous demand for "home-made" pies, an artificial preparation of agar-agar, salt and sodium glutamate powder is used instead of stock, with consequent loss of flavour and tactile appeal, since even an untrained palate rapidly distinguishes between a salt-agar gel and a solidified meat-stock gel. It is in many ways to be deplored that this form of "substitution" takes place so widely, as it is scarcely a matter of cost, but of a little extra trouble. In this connection, certain of the larger London firms are showing an excellent example in reviving the older standards of flavour by reverting, even on mass-production scales, to the more "natural" methods.

Choice of Flavouring Methods

It is not the purpose of this article to detail a long list of recipes for the preparation of artificial flavours; for these the reader is referred to the many excellent formularies which have been published within recent years. However, in flavouring there are certain basic decisions which must be made before any consideration of formulæ can take place, namely, whether:

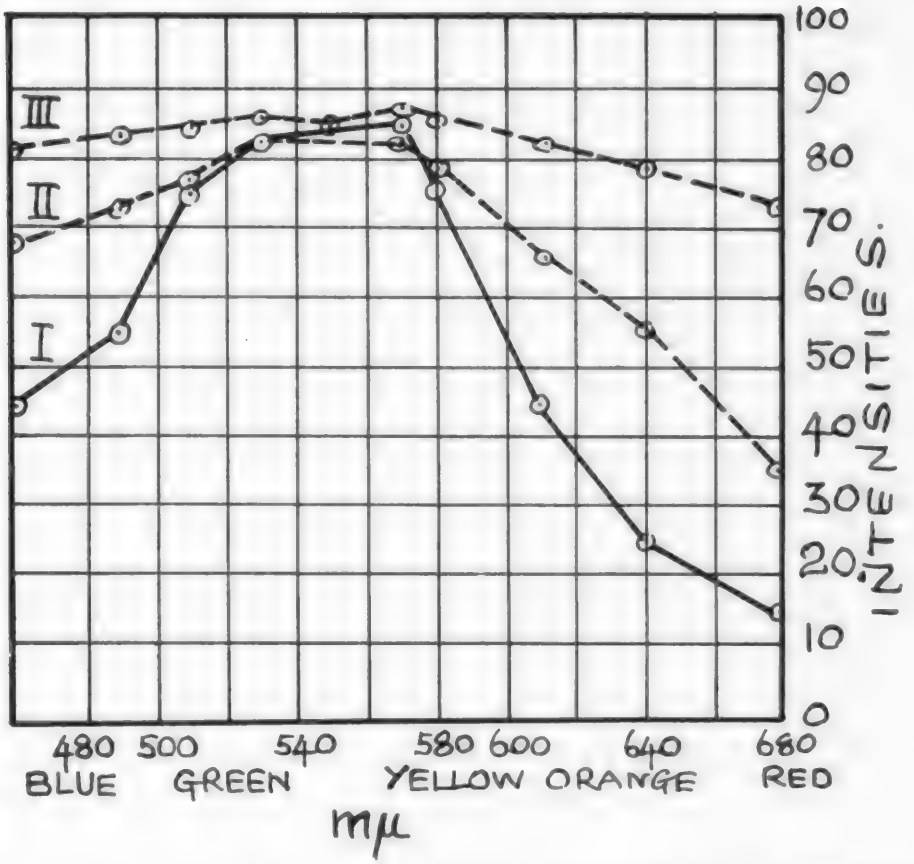
(*a*) To use products entirely from the natural source of the flavour.
(*b*) To use entirely natural flavours, but not necessarily those from the source imitated.
(*c*) To use a combination of natural and synthetic products.
(*d*) To use synthetics only.

In the exclusive use of products from the natural source, such as, for example, the use of expressed lemon oil in lemon flavours, the following difficulties may arise:

(1) Evanescence of the flavour; this is common and need not be further considered.
(2) Prohibitive cost or complete unavailability of the natural product. This case arises, of course, with peach and pineapple flavours, where it is not possible to obtain natural extracts of a suitable character.
(3) Difficulties of solubility and of incorporation. The so-called "terpeneless" oils overcome to some extent the latter difficulty, but as a rule it is more important to select a reliable source than to insist upon certain physical and chemical details of character. Of course, the "terpeneless" oils are stronger as flavouring agents than the natural products from which they are derived, as in the case of the terpeneless and sesquiterpeneless oil of lemon, a considerable degree of solubility in aqueous alcohol is achieved by the removal of the terpenes and sesquiterpenes.

Fruit Syrups

Perhaps the most satisfactory field for the use of entirely natural products is in that of fruit syrups. These



The solid curve represents the absorption of a sample of greengage jelly as supplied, the broken curves II and III show the colour after six and eighteen hours' exposure in the Fugitometer.

are now in greater demand than ever since the advent of the "milk bar", although much of the so-called fruit syrups of these retailers is entirely synthetic.

True fruit syrups are made by expressing the juice, pasteurising and clarifying and evaporating in vacuum. Stone and berry juice is improved if the mixture of pulp with a little sugar is fermented before clarification, but an appreciable alteration in flavour takes place which is not wholly desirable, especially with the softer fruit; when vacuum concentration is practised, the first distillate is re-run and the volatile fractions returned to the syrup in order to preserve the flavour.

It is a very debatable point as to whether it is desirable to mix natural syrups with synthetics or isolates to obtain added flavouring power. The present writer is of the opinion that it is usually injudicious to do so in the majority of cases; thus, with the mineral water trade, it is preferable to deal frankly with such beverages as raspberry, strawberry, pineapple and the like, either from the standpoint of a high-grade natural syrup or with a definite synthetic essence; to mix the two usually destroys the good points of both. Such a mixture almost invariably tastes "wrong" in the sense that one is conscious of the synthetics without appreciating the natural ingredients.

This is even more true of table jellies of strawberry, raspberry, pineapple and greengage flavour. Attempts on a manufacturing scale to utilise natural syrups almost inevitably lead to a product which is inferior to those that are quite frankly only of synthetic origin. In this connection it must be remembered that the public is not expecting the greengage or pineapple jelly to taste exactly the same as the fruit; they expect them to taste like greengage or pineapple jelly, which is quite a different matter!

Discretion Needed

On the other hand, whatever materials are used, they must be used with great discretion, and any unusual ingredients must be balanced by the use of others. Thus the minute trace of quinine used in the various "tonic waters" must be very discreetly applied and can be balanced by the use of the merest suspicion of saccharin. Saccharin in this case should be used in addition to the sugar of the formula, since it is a mistake to consider that sugar and saccharin are replaceable the one by the other. Experiments have shown that saccharin stimulates a different group of taste-buds from those which respond to cane sugar, and this is taken advantage of in the flavouring of mineral waters to "modify" the action of bitters.

In general, it may be said that the use of colour and flavour, if discreetly applied, adds to the enjoyment to be obtained from foods and drinks, but that the rapidly rising level of public taste makes it imperative to use imitative flavouring and colouring very carefully; on the other hand, success has been achieved on the Continent by the use of flavours which have no relation to natural fruits. In Denmark, for example, a very popular mineral water is marketed with a flavour built round that of undecylicaldehyde used discreetly, modified with saccharin

CHEMICAL ENGINEERS DINE TOGETHER

A VERY representative company assembled on Friday last at the Waldorf Hotel on the occasion of the Nineteenth Annual Meeting and Dinner of the Chemical Engineering Group of the Society of Chemical Industry.

The Chairman, Mr. Stanley Robson, retired after three years of office and Mr. William Russell takes his place.

At the dinner the Chairman proposed the loyal toast and was followed by the Chairman-Elect, who proposed the Society of Chemical Industry, to which toast Lord Leverhulme, President of the Society, responded. Mr. J. M. MacQueen welcomed the guests, on whose behalf Dr. William Cullen, President of the Institution of Chemical Engineers, returned thanks.

Dr. J. J. Mallon, M.A., LL.D., J.P., Warden of Toynbee Hall, whose amazingly varied activities were described by Mr. Robson in a graceful introductory talk, gave the address of the evening. The expression of his tremendous conviction of the potentialities of the English race for the leadership of the rest of the world shone through a puckish humour which kept the company spellbound for the best part of an hour.

He deplored the sour spirit which threatens civilisation and democracy. Dictators were rampant. Things dear and precious to us were threatened. He likened the present state of things to that of the times of Castlereagh and Canning, who opposed European dictatorships. The history of the last 100 years was the history of their frustration by this country. The English point of view favoured democracy against every kind of dictatorship, whether it be of the left or the right.

The speaker pointed out that things were being done in the dictator countries which might well be emulated by us—mainly their concentration upon Youth. He stressed the value of the human child and the necessity for training him to cope with his future responsibilities. There was a new principle needed. Class differences should be eliminated. Incidentally, the law of inheritance should be abolished and an aristocracy of intellect established.

The English (Dr. Mallon continued) were rather slow and dull, but in this poisoned and separated world England has a genius which no other country possesses—the genius for freedom and kindliness and graciousness.

He was convinced that these were the attributes which really mattered and which should ensure the scrapping of minor internal frictions and class differences.

Dr. Mallon's speech was full of apt and humorous illustrations, and his description of the meeting at Toynbee Hall of a deputation of Cambridge undergraduates, on special strike duties, and dockers, during the General Strike, brought the house down. Contrary to expectation, the proceedings were carried on in perfect amity. The only time trouble threatened was during a discussion between two dockers who each mistook the other for a member of the Cambridge deputation!

The Chairman thanked the speaker for his brilliant discourse, and the evening concluded with a speech from Mr. W. A. S. Calder (Vice-Chairman and Past-Chairman of the Group), who expressed the appreciation of his colleagues for the work of the retiring Chairman, which was confirmed by the assembled members and guests with musical honours.

Among those who accepted invitations were: Anderson, J. M.; Baker, Arthur, and Guest; Baker, Dr. Stanley; Bromilow, P. W.; Broughall, A. J.; Calder, W. A. S.; Callingham, W. E.; Carnegy-Potts, A. W. K., and Guest; Cash, W. A.; Clark, F. W.; Copley, E. D.; Cremer, H. W.; Crosbie-Walsh, T.; Cullen, Dr. Wm.; Donald, M. B.; Dunbar, Malcolm; Elliott, R. A.; Evans, E. V.; Evans, W. Edmund; Flint, J.; Foott, Dr. C. Hamilton; Greene, F. A.; Higgs, A. E.; Horn, Freeman; Hornbuckle, T.; Hyams, H.; James, C. W.; Jebsen, Dr. G.; Jones, T. W.; Joyce, A. G. E.; Lampitt, Dr. L. H.; Law, W. A.; Leonard, H. R.; Leonard, Julian M.; Leonard, R. M.; Leverhulme, The Rt. Hon. the Viscount; Lewis, Dr. P. S.; McDowell, R. H.; Mackie, C. J. T.; MacQueen, J. M.; MacTaggart, E. F.; Mallon, Dr. J. J.; Marx, R. J.; Miall, Dr. Stephen; Monypenny, J. H. G.; Napier, J. W.; Napier, J. Watson; North, Dr. T.; Ogilvie, G. M.; Peck, W. C.; Peel, P. R. E.; Pooley, H. J.; Pratt, J. Davidson; Randall, J. H.; Reavell, Brian N.; Robertson, Dr. J. Hoy; Robson, Stanley; Ronca, J. F.; Rotstein, A.; Russell, Wm.; Sanders, Alexander; Schweitzer, Dr. Hans; Smith, F. C. B.; Stopford, Chas. J.; Talbot, H.; Thorp, H. W.; Underwood, Dr. A. J. V.; Weber, I. E.; Webster, A.; Wright, B. H.; Wright, H. B.

Colour and Flavour of Packed Foods
(Concluded from previous page)

and sweetened lightly with sugar. A pale amber colour is used. Here again the pack is interesting, a tall, pale yellow-green bottle is used, somewhat similar to that used for hock; sealing is performed by a crimped cap. There is still a market to be created and supplied with a similar drink in this country, but we must depart from the heavy and unsightly mineral water bottle as used now, and the degree of carbonation must be reduced.

Containers

Finally, a few words may be said on the convenience of the container. Quite frequently an excellent preparation will fail to achieve the popularity it deserves through an inconvenient container. As as example, one may cite the maker of a thick sauce who attempted to depart from the stereotyped and conventional "square" bottle and used an "up-to-date" pack which had an excellent appearance and good selling value. The snag lay in the fact that the bottle-neck was so narrow (the sauce being thicker than usual) that it required both patience and strength to remove the contents.

The effect is dual—not only does the purchaser become annoyed that he cannot readily and rapidly transfer the sauce to his plate, but he eats less of it and so destroys potential sales.

SOFT FRUIT CONCENTRATES

W. J. Bush and Co.'s new factory at Hackney. A new annex to "Ye oldeste essence distill'rs".

"While he forth from the closet brought a heap
Of candied apple, quince and plum and gourd;
With jellies soother than the creamy curd,
And lucent syrops, tinct with cinnamon;
Manna and dates, in argosy transferred
From Fez; and spiced dainties, every one
From silken Samarcand to cedared Lebanon."

The Eve of St. Agnes.

THE MANUFACTURE of fruit juice concentrates is an industry in itself and calls for the installation of expensive plant and the utmost attention to hygienic conditions of working.

Main Operations

The main operations involved in the production of a concentrated fruit juice are the selection and sorting of the fruit; extraction of the juice by means of a hydraulic press; clarification with the aid of high-speed centrifuges followed by filtration in presses and, finally, concentration in high vacuum or by freezing.

As Nature does not produce standardised fruits, these operations are not so simple as they might appear at first sight. The acidity, sugar and pectin content and the specific gravity of the juice before concentration are some of the variations to be contended with, and the most meticulous control over these and other factors must be continually exercised.

Another important item is the avoidance of the passage of yeasts, always present on the surface of the fruit, into the finished article. Hence a strict watch must be kept on the functioning of the centrifuges and filters.

The New Factory

The factory, which is a self-contained unit and situated apart from the main buildings, may be fairly termed the last word in modernity. Its lay-out is evidence of careful planning and an eye for beauty. One enters the building through a waiting-room, the stained windows of which, depicting fresh fruits, give an immediate topical note.

Insulation

The factory itself is of long rectangular shape, and the walls of the long sides are composed of hollow glass bricks which have been vacuumised, thus forming an excellent insulating medium.

Ventilation

There are no windows. Ventilation is effected by air-conditioning which produces a very slight over-pressure of air inside. All the air is efficiently filtered, thus excluding the possibility of contamination of the products by moulds, yeasts and bacteria. All the plant is of

A general view of the interior of the model factory.

One of the juice presses and a mobile tank.

Another view of the interior, showing filter presses and other plant.

The laboratory at the factory.

Another view of the laboratory.

stainless steel and most of it is mobile, thus constituting a flexible arrangement. The pipes conducting water, steam, compressed air and vacuum, etc., run round the building, and are accessible at any point.

The Laboratories

At one end of the factory at first-floor height are the laboratories, the doors of which lead out on to a balcony from which every phase of the factory processes is visible. In addition to the usual apparatus for chemical and biological control, there is equipment for experiments on a semi-industrial scale.

Cold Storage

Underneath the ground floor is situated the cold store, in a part of which is installed the air-conditioning plant. In view of the political situation, the building has been constructed in such a way as to provide shelter for the whole staff in the event of hostilities.

Welfare

The welfare of the employees is excellently catered for. Outside the main factory and completely apart is a first-aid room entirely lined with white tiles. In another part are a number of shower-baths for the operatives.

The attention to detail in connection with every possible item of hygienic precaution and the advantage taken of modern methods make this factory a model of its kind.

Suppliers to new Fruit Juice Factory:

Laboratory Equipment: *Townson and Mercer, Ltd.*, 34, *Camomile Street, E.C.*3; *Griffin and Tatlock, Ltd., Kemble Street, W.C.* 2.
Stainless Steel: *Firth-Vickers Stainless Steels, Ltd., Staybrite Works, Sheffield.*
Centrifuges: *Lang (London), Ltd., Euston Road, N.W.* 1.
Tanks: *Metal Propellers, Ltd., Purley Way, Croydon.*
Filterpress: *Farrow and Jackson, Ltd.*, 16, *Great Tower Street, E.C.* 3.
Insulation: *Celotex, Limited, North Circular Road, N.W.* 10.
Automatic Stokers: *James Gordon and Co., Ltd., Regent House, Kingsway, W.C.* 2.
Meters: *Bailey Meters and Controls, Ltd., Progress Way, Croydon.*

Book Reviews

A Book That Tells The Truth About Poison Gas!

Among the spate of "scare" headlines and sensational stories of the effectiveness or otherwise of Air Raid Precautions, has appeared a book by Professor James Kendall of the University of Edinburgh. This has the effect of a cool wind on a hot day, and the refreshing sanity and logic with which he tackles the subject is in marked contrast to much written material dealing with poison gas.

Dr. Kendall's qualifications for writing the book are extremely sound. Apart from the highest academic attainments, his experience as Professor of Chemistry of Edinburgh is supplemented by practical experience in wartime use of poison gas, as he was a Lieutenant-Commander in the U.S. Naval Reserve, acting as Liaison Officer for chemical warfare with the Allied Services.

The foreword explains that the volume has been written from a sense of national duty: Dr. Kendall claims to have no axe to grind; he is affiliated to no political party.

Whole tone of the book is that the greatest danger is panic among the population, that if they set about understanding the elements of gas warfare, its capacities and limitations, the fear of gas attacks, largely psychological, will be greatly diminished, and preparations will be made calmly.

The author does not attempt to decry the Government advice on protection against poison gas. His only criticism is that the recommendations are at least adequate, and that even less complicated arrangements can be described as safe.

On many occasions the Professor takes a tilt at other authorities and writers. H. G. Wells comes into the picture early in the book, and his descriptions of gas attacks in *The Shape of Things to Come* are cited as examples of blood-curdling literature not in accordance with known facts. Some telling quotations are made here. The Cambridge Scientists' Anti-War Group's conclusions are also doubted, and Dr. Kendall is of the opinion that the experiments upon which they were based were not in accord with actual war conditions. The "secret gas" bogey is well and truly slain.

The author treats this unpleasant and dreadful subject with a light hand, occasionally with a leaven of humour, but entirely without levity. Obviously his aim is to decrease in some measure the psychological dread of poison gas, and to show that it is by far the least deadly method of waging war at present in use. This is a book that should be universally read.

F. B. F.

Breathe Freely! By Professor James Kendall, M.A., D.Sc., F.R.S. Pp. 179. London. 3s. 6d.

Medical Jurisprudence

Summing up at the trial of Spencer Cowper in 1699, Baron Hatsell the judge made the following observation: "I am sensible that I have omitted many things, but I am a little faint and can remember no more of the evidence."

The technicalities of the medico-legists had confused the learned judge, and having regard to the lack of precision of medical evidence at that time, this is hardly surprising.

A book recently published is eloquent testimony to the advances which have been made in medical jurisprudence. Most of them belong to the twentieth century. The agglutination tests for blood, and identification of blood groups, for example, are both discoveries of the last forty years. Locard's poroscopy and the modern technique of the reconstruction of skeletal remains are instances of methods of the identification of the person, both quite recent in origin.

Toxicology, also, which certainly lacked precision in the nineteenth century has developed to such an extent that the poisoner's position is much more dangerous than it was even twenty years ago.

Professor Glaister's book also emphasises by reason of the wide field it covers the co-operative nature of scientific criminal investigation. Not the least impressive aspect of the progress made is the manner in which chemistry, physics and other branches of science supplement and reinforce the purely medical approach to an enquiry. That scientific investigation is, on a last analysis, indivisible, is nowhere better shown than in contemporary medical jurisprudence.

There is one aspect of legal medicine, however, which has been somewhat neglected. Handwriting is a subject of great medico-legal importance. It has received very little specialised attention except from Rogues de Fursac in his classic book written in 1912 and not reprinted; and from Locard in Vols. 5 and 6 of the *Traité de Criminalistique*, which deal exclusively with forgery and handwriting. This lack of authoritative treatment in the English literature is unfortunate, if only because it gives the charlatan and quack a field of activity from which they ought, in the interests of justice, to be excluded.

H. T. F. R.

Medical Jurisprudence and Toxicology. By John Glaister. 6th Edition. Edinburgh. 1938. 25s.

Organic Chemistry

At a time when one reviews so many new editions of old friends in general technical and text-books, it comes as a distinct shock to receive, hot from the press, an up-to-date, well printed, well laid out text-book on organic chemistry that has not before seen the light of day. Covering the field of organic chemistry needed by second-year medical students and those reading for a general B.Sc. degree, the chapters dealing with the carbohydrates, prurines, proteins, and fermentation are treated more fully than is usual. The work is adequately illustrated and the omission of details of preparation and estimations is an asset, since these details are readily obtainable from standard works. Questions from London University and Institute of Chemistry examinations end each chapter.

J. P. L.

Organic Chemistry. By F. Prescott, M.Sc., Ph.D., A.I.C., and D. Ridge, M.Sc., A.I.C. Pp. 688. London. 1938. 8s. 6d.

Bacteriological Chemistry

Only certain aspects of immunochemistry have been dealt with in this book, and no attempt has been made to consider chemotherapy and disinfection or the chemistry of culture media and staining reactions. The author correctly points out that any treatment of these subjects would, in the present state of knowledge concerning them, resolve itself into "catalogue" treatment. This has been constantly in the author's mind, and results in a much needed and highly useful book commendably free of "catalogue" or routine material. Research workers needing information concerning the metabolic behaviour and chemical nature of organisms will find this work of good use. The book covers the ground needed for the University of London Academic Diploma in Bacteriology and gathers together much information heretofore scattered. Recommended.

L. J.

An Introduction to Bacteriological Chemistry. By C. G. Anderson, Ph.D., D.Bact. Pp. 278. Edinburgh. 1938. 10s. 6d.

SYNTHETIC FLAVOURS

[*Courtesy, African Canning and Packing Corporation.*

Harold Silman, B.Sc., A.I.C.

ARTIFICIAL FLAVOURS are nowadays added to practically all types of food products, either for the purpose of simulating the natural flavour of fruits or spices or to enhance a flavour already present. Synthetic flavouring compounds are, as a rule, only partially composed of artificially prepared products, and are based to some extent on the natural extract. It is in this way that the best flavours are made.

It must not be assumed that all flavours containing synthetics are automatically inferior to the so-called "natural" products. Strictly speaking, the addition of sugar to a natural fruit extract makes it a synthetic flavour, but this is universally practised, even by the housewife. Certain natural juices, *e.g.* strawberry juice, are insipid and uninteresting by themselves, yet when fortified by a little sugar, fruit acid, and so on become delicious.

Definition of a Synthetic

The term "synthetic" is, however, generally understood to mean a compound prepared chemically, often from a source totally unrelated to the substance it is desired to imitate, but which resembles it more or less closely. A good many synthetic flavours, on the other hand, consist to a considerable extent of the actual compound present in the natural extract, which is largely responsible for its flavour. The aroma of oil of bitter almonds, for example, is due to the presence of a large proportion of benzaldehyde, identical in constitution with the benzaldehyde which is prepared in quantity from coal tar derivatives. The natural oil has a slightly different flavour from benzaldehyde to the experienced palate. This is due to the fact that natural plants do not produce a pure chemical compound; the essential oils formed within them are invariably associated with minute amounts of related substances, and it is these which lend to the natural product its individuality. The number of these substances is so large and the sensitivity of the palate so great that it is a practical impossibility to make a synthetic flavour which will exactly simulate any natural extract. It is possible, however, to attain a degree of approximation which will satisfy the ordinary taste.

Exotic Flavours

On the other hand, there is no real reason why we should confine our attention to the slavish imitation of existing natural essences. With the facilities which the recent advances in synthetic chemistry have given us it is possible to blend flavours which are highly attractive and pleasant, yet bear no resemblance to anything found in nature. This tendency towards the production of exotic flavours has already shown itself, but there is a great deal of human conservatism to be broken down before the public takes to them more widely. It must also be borne in mind that whereas most people are familiar with the commoner flavours and know what to expect approximately when they purchase a pineapple flavoured drink, it is more of a venture in the dark when one asks for an "Angel's Glory", for instance. For this reason it might be as well if manufacturers concentrated on the popularisation of relatively few of such flavours at first with some kind of systematised nomenclature to suggest sweetness, tartness, etc., according to the taste of the consumer. It is probably on some such lines as these that future development will take place.

Natural Essential Oils

The essential oils responsible for the flavour of natural fruits and spices are distributed in many different parts

of various plants. They are found in the leaves, berries, bark, roots, shoots, and so on. Very often different parts of the same plant may produce entirely different oils.

The process of extracting the oil varies. In some cases a system of pressing is used. Lemon oil, for instance, is extracted from the peel by simply flattening the curved portion of the cortex against a surface, when the essential oil runs out and may be collected. Orange oil, which is usually obtained in smaller yield, is collected on a sponge; this is squeezed into a receptacle when it has absorbed a fair quantity of the oil. In some cases the rinds are wrapped in filter cloths and the whole placed in presses to extract the oil. As produced in this way the oil is cloudy, on account of the presence of minute particles of solids and droplets of water. On standing for a week or so separation takes place and a natural clarification occurs. The process can, however, be hastened by filtration with the addition of about ¼ per cent. of the so-called "filter-aids" (of which there are several brands on the market), consisting of highly absorbent neutral earths. This same procedure can be adopted when it is desired to brighten a finished essence which has become a little cloudy during compounding.

Distillation of Oils

Oils may also be extracted by distillation of appropriate portions of the plant in suitable stills. This method is common, but has the disadvantage that the relatively high temperatures developed may in some cases destroy, or at least change, the natural aroma of the oil. By distilling under reduced pressure a considerable improvement is effected, but very often, as when oils are produced by comparatively primitive distillation methods in the field, facilities for obtaining reduced pressure are not available. In such cases steam distillation proves advantageous. In this method steam is passed into the container, when a mixture of water and the required oil distils over and is separated by standing. Each case must, however, be treated on its merits and the appropriate method of extraction adapted to the type of plant and oil and the facilities available.

Terpeneless Oils

It was early realised that only a portion of the essential oil of any plant is active as a flavouring material. The rest is made up of a variety of substances which are, in general, closely related to one another in their chemical constitution, and termed terpenes. Varying amounts of other bodies are also present, the chief of which are the sesquiterpenes. It is therefore obvious that if these neutral terpenes, which act simply as diluents to the desirable material in the essential oil, can be eliminated, the result will be a much more highly concentrated flavour. A further advantage attached to the removal of the terpenes is that the latter are comparatively insoluble substances. This is a disadvantage if highly soluble flavours are desired, such as is the case in the mineral water industry.

Preparation

Terpeneless oils are prepared by a variety of methods, and the process of manufacture is one involving considerable experience. Briefly, the oils are fractionally distilled, sometimes under reduced pressure or in steam. The terpenes distil over first, followed by the sesquiterpenes, and finally the odoriferous oil itself. Of course, separation into these three fractions is not complete. The sesquiterpenes are often not removed, as their proportion is relatively small as compared with the terpenes; moreover, the attempt to separate them may result in decomposition of the aromatic oil.

Another method of separation which is in use consists in distilling the oil with alcohol. The lower layer of the distillate consists chiefly of an alcoholic solution of essential oils, whilst the upper layer contains the terpenes together with a residual proportion of the undissolved oils. This layer is subjected to repeated redistillation until most of the essential oils have been removed. This method, although slow, gives a fine product.

The amounts of terpenes present in various essential oils differ enormously, and in some instances little is gained by preparing the terpeneless oil, except perhaps an increased solubility. The outstanding example of the advantage of terpene separation is in the case of lemon oil. This oil contains at least 90 per cent. of non-odorous terpenes and sesquiterpenes, only slightly soluble in alcohol. Their presence lessens the stability of the oil, and they are liable to oxidise with resinification of the oil. For this reason terpeneless lemon oil is about 25 to 30 times as strong as the natural oil. The sesquiterpeneless oil is even more concentrated and is highly soluble, being miscible in all proportions with a 60 per cent. solution of alcohol. In the case of other oils, such as cinnamon and clove oils, for example, the terpeneless oils are not usually more than twice as strong as the natural oils, although they are considerably more soluble.

Fruit Juices

There is no doubt that in order to obtain the finest type of artificial flavour it is necessary for a proportion of natural fruit juice to be present. It is only in this way that the numerous minute traces of aromatic materials to which the palate is sensitive can be introduced. Flavours from which natural juice is absent are somewhat harsh and lack delicacy and roundness of flavour. The amount of juice which is mixed with the synthetic essence varies from 20 to 60 per cent. and depends on the concentration and type of fruit. Essences based on fruits which are themselves highly flavoured need a relatively smaller proportion of natural juice than those made from fruits of less prominent taste.

Fruit juices are expressed from the whole fruit by subjecting it to pressure in apparatus of a suitable type. The juice so obtained may be filtered or allowed to settle for clearing. The increasing popularity of cloudy drinks has helped to eliminate filtration, especially in the case of the citrus juices, and a proportion of the fruit cells is often purposely left in or added to the extracted juice.

Manufacture of Flavours

In the preparation of flavouring materials care must be taken that the product is adapted to the purpose for which it is required. Mineral water flavours generally

require to be very soluble (except for cloudy drinks, ginger beer, etc.). Flavours for boiled sweets and for use in the baking trade must be made of materials stable to heat. There are a number of classes of chemical compounds which are very important in the production of essences on account of their pronounced aroma. Foremost amongst these are the *esters*, which are compounds of an alcohol and an acid, and intermediate in properties between these. The esters are present in a large number of natural essential oils. Typical esters are amyl acetate (pear), amyl propionate (apricot), etc. Many natural oils are actually valued by their ester content, which has led to adulteration by the addition of cheap substances with a high ester value. The ester value, however, cannot be taken as a universal guide to flavouring power, but is a helpful, if limited, criterion.

The *alcohols* are less pronounced in odour, but are used in conjunction with esters. They are readily oxidised to the *aldehydes*, which have a tendency to instability (being oxidisable to acids), but have characteristic strong odours. *Ketones, ethers*, and other types of compounds also find application in essences.

Fixatives

Besides the more volatile odorous bodies, a synthetic essence needs to contain a fixative, in order to render the flavour less fugitive than it otherwise would be. The presence of a suitable fixative is particularly important in baking and confectionery. In other cases, too, the absence of a fixative makes the flavour somewhat undefined as far as the palate is concerned. There are many fixatives available, and these have usually only slight flavours in themselves. Vanillin is widely used for this purpose, whilst coumarin and benzyl benzoate also find considerable application. In recent years the introduction of the glycol esters has given the essence manufacturer a series of very useful solvents which also act as fixatives. Numerous mixtures and types of these are sold under various trade names. Glyceryl triacetate has also been advocated as a specially useful solvent and fixative.

Media

In the matter of solvents, the alcohols are still used to a large extent; ethyl or iso-propyl alcohols are those chiefly employed. In other cases the flavour may be adsorbed on to a powder by incorporating the liquid with an absorbent neutral material. It is then marketed as a dry essence. Only essences which do not contain readily oxidisable substances such as aldehydes are suitable for the preparation of dry flavours, owing to the large areas exposed to the air. Dry essences are simple for the confectioner to manipulate, but they have a tendency to be defective in regard to stability.

Sometimes fats are used as a media for the preparation of flavours, but these must be carefully selected so as to be free from any liability towards rancidity. In America there has recently been an increased tendency to market flavours in the emulsion form. This is no disadvantage in the baking and confectionery trades and in the flavouring of the cloudy type of drink. The preparation of a stable emulsion of essential oils without using any emulsifying agent which might react with the flavouring constituents is, however, not a simple matter, and by reason of the difficulties involved emulsified flavours have not yet become as popular as they should be. Actually emulsification is the ideal solution to the problem of uniformly incorporating a flavour into a large mass of material, as it enables even dispersion to be readily obtained. Ordinary alcoholic solutions of essential oils must be added to the material it is desired to flavour very gradually in order to make certain that the oil is not thrown out in large globules. Acids such as citric and tartaric acids are useful in aiding the dispersion of essential oils. The incorporation of these acids in a commercial essence is, however, inadvisable; such solutions may deteriorate on keeping.

Some Synthetics

The number of synthetics is legion, and the ways in which they can be combined to produce any given flavour depend on the skill of the experimenter. Recently there have been numerous additions to the range of materials available, and the number of these is being added to almost daily. Numerous formulæ have been published, but much depends not only on the art of compounding, but on the careful selection of raw materials of the purest odour. Unless due attention is paid to this point the quality of the finished essence will be far from satisfactory.

In the succeeding paragraphs are listed a few of the chief materials used in various common flavours, including many of the newer synthetics now available. The use of each is by no means limited to the heading under which it is placed. The paragraphs are only intended to show the type of flavour in which the presence of the particular synthetic is likely to be effective.

Almond

Benzaldehyde ($C_6H_5.CHO$), b.p. 180° C., sp. gr. 1·05. The chief natural constituent of oil of bitter almonds. Must be free from chlorine if of synthetic origin.

Apple

Ethyl valerianate ($C_4H_9.COO.C_2H_5$), b.p. 135° C., sp. gr. 0·87. Useful for imparting a rich, fruity aroma to many essences.

Ethyl malonate, b.p. 198° C., sp. gr. 1·06. Sweet apple odour.

Apricot

Ethyl butyrate ($C_3H_7.COOC_2H_5$), b.p. 121° C., sp. gr. 0·90. Used also in many fruit essences.

Amyl butyrate ($CH_3.CH_2.CH_2.COOC_5H_{11}$), b.p. 177° C., sp. gr. 0·86. Rich odour reminiscent of apricot and pineapple.

Banana

Benzyl acetate ($C_6.H_5.COOCH_3$), b.p. 210° C., sp. gr. 1·06. Present in cassie and neroli.

Cherry

Amyl formate ($H.COOC_5H_{11}$), b.p. 122° C., sp.gr. 0·88. Odour reminiscent of cherry and plum.

Ethyl pelargonate ($CH_3(CH_2)7.COOC_2H_5$), b.p. 228° C., sp. gr. 0·87. Sweet rose-like odour; also useful in pineapple compounds.

LEMON

Citral ($C_9H_{15}.CHO$), b.p. 225° C., sp. gr. 0·89. This is manufactured from lemon or from lemon grass. The former is far superior in flavour.

Methyl nonyl acetaldehyde.

Citronellal ($CH_2.C.CH_3(CH_2)_3.CH.CH_3CH_2.CHO$), b.p. 207° C., sp. gr. 0·85.

PEACH

Gamma-undecalactone (Aldehyde C14). Has a very powerful peach-like aroma, and must be used with discretion.

Iso-amylbutyrolactone. Similar to the above.

Phenyl ethyl acetate ($C_6H_5.CH_2.COOC_2H_5$). Useful in small amount.

PEAR

Amyl acetate, b.p. 138° C., sp. gr. 0·87. Occurs in pears and bananas.

PINE

Bornyl acetate, m.p. 28° C., sp. gr. 0·99. Has an odour of pine needles, in which it occurs, and is used in small amount in pineapple flavours.

PINEAPPLE

Butyl butyrate, b.p. 165° C., sp. gr. 0·87. Used in fine pineapple essences, together with ethyl and amyl butyrates.

Ethyl sebacate ($C_2H_5.COO(CH_2)_8.COO.C_2H_5$), b.p. 307° C., sp. gr. 0·87. Used in many fruit flavours.

Ethyl iso-amyl-oxy-butyrate is also used in other fruit flavours.

PLUM

Phenyl propyl butyrate ($C_6H_5.(CH_2)_3.COO.CH(CH_3)_2$), b.p. 120° C., sp. gr. 0·99. The corresponding isobutyrate has a similar aroma, but somewhat more delicate. Amyl formate also finds important application in plum flavours.

RASPBERRY

Gamma-nonyl lactone is highly useful in small amount with ethyl and amyl acetates as the principal basis.

STRAWBERRY

Ethyl methylphenyl glycidate. This substance has a strawberry odour, which is, however, not a pure one. It must be used in very limited amount.

Beta-naphtholbutyl ether ($C_{10}H_7.O.C_4H_9$), m.p. 32° C., is less powerful and is used in many strawberry flavours. The ethyl ether is also employed.

Some Miscellaneous Materials

Anethole is an excellent aniseed flavour and is found in the plant.

Cinnamic aldehyde is the natural aromatic constituent of cinnamon.

Butyl undecylate has a distinctive cognac odour.

Diacetyl is a heavy liquid and has an extremely intense odour of butter. It is used in flavouring margarine and in preparing butter flavours for confectionery.

Ethylphenyl acetate is used in honey flavours.

Methyl anthranilate finds extensive use because of its powerful orange oil odour.

Vanillin is a valuable fixative, and is the main constituent of natural vanilla.

Physical Constants

The values for the specific gravities and boiling points of the synthetics given above are useful in the determination of the proportion of them present in the natural oil. For example, a specific gravity lower than about 0·9 indicates that the oil contains a high proportion of terpenes or aliphatic substances. A value higher than unity shows the presence of substances of the benzene series in high proportion. Intermediate values are indicative of a mixture. If the boiling point of the oils is between 150° and 200° C. there are terpenes present, whilst sesquiterpenes raise the boiling point considerably higher.

(Abstracted from the *Manufacturing Chemist.*)

OATS AND BARLEY SUBSIDY SCHEME

UNDER Part II of the Agriculture Act, 1937, the Minister of Agriculture and Fisheries as regards England and Wales and Northern Ireland, and the Department of Agriculture for Scotland as regards Scotland, are empowered to pay in respect of the five years 1937 to 1941 subsidy payments to growers of oats or barley in any cereal year when the average price of oats during the seven months September to March is 7s. 7d. per cwt. or less.

By the Home-Grown Oats (Ascertained United Kingdom Price) Order, 1938, dated April 20, 1938, the average price for oats in the United Kingdom for the seven months ended March 31, 1938, has been declared by the Ministers concerned to be 7s. 7d. per cwt. In consequence of this determination, subsidy at the rate of 2s. 6d. per acre will be payable to those growers whose applications were made in accordance with the regulations and have been accepted.

The issue of payable orders commenced on May 2, and extend over a period of about seven weeks.

TASTING DAY AT LONG ASHTON

DR. H. V. TAYLOR made a good point for scientific research on presenting the prizes for ciders at the Long Ashton Research Station on Thursday, May 5, when he said that there were two varieties—"ancient and modern". He suggested that the old style might have been all very well for the trained stomachs of rustic populations, but something better was necessary to induce the more sophisticated (or less hardy) townsman to drink it in commercial quantities.

The Prize-Giving

Mr. Paget Norbury, in introducing Dr. Taylor, paid tribute both to him and to the work of the Institute.

Professor J. F. Dobson, Pro-Vice-Chancellor of the University of Bristol, and Professor B. T. P. Barker also spoke.

In the Fruit Plantations

Conducted tours of the plantations and orchards were made at intervals during the day, which demonstrated to the visitors the experiments in progress at the Station.

Fruit growers were enabled to inspect the latest advances in the establishment and after-care of cider orchards and instructive examples of types of trees for planting; staking and guarding methods; shaping and pruning of the head of the tree; methods of head working of unprofitable trees. Methods of disease and pest control for market garden crops as well as fruit were ably demonstrated.

Products Building

The working model of an apple juice production plant which demonstrated the latest advances in the valuable work carried out by Mr. V. L. S. Charley, well known as a pioneer of fruit juice research in this country, was shown.

[Courtesy, Western Daily Press and Bristol Mirror.

Dr. Taylor addresses the gathering.

[Courtesy, Western Daily Press and Bristol Mirror.

Dr. H. V. Taylor, Commissioner for Horticulture, presenting a prize to 15-year-old W. P. Bullock.

Visitors were able to see the complete process from apples to canned juice, and we were lucky enough to have Mr. Charley himself to explain it.

Incidentally Mr. Charley explained that the apples used are not cider apples, but such varieties as Bramley's Seedling. He stated that the surplus apple position in this country was getting worse and worse and that the juice industry would be a valuable one from this standpoint. He stressed the necessity for adopting a process which would enable the juice to be sold cheaply—he suggested that if a half-pint could be sold at 4d. retail, sales would increase. His work has been directed towards the simplification and consequent reduction in cost of the process as well as towards the high quality of product.

The process as demonstrated was the pressing of the apples by standard methods as used in cider production. Long maceration was found to be unsatisfactory, and the present juice was only macerated for twenty-four hours with 20 per cent. of the press cake. The next step was the centrifugalisation, which removed tissue. Clarification was effected by the addition of enzymes, during which process the precipitation of proportions of pectic acid occurred. Next, filtration by means of plate and frame presses. A most important item of the process consisted in the de-aëration of the filtered juice. It has been found that the presence of air during subsequent pasteurisation affected the flavour by oxidation. By submitting the juice to a 29" vacuum in a special apparatus, 91 per cent. of the air is removed.

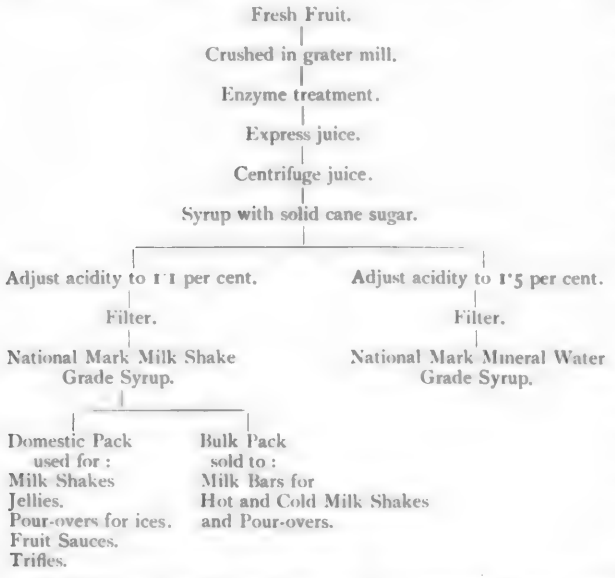
The de-aërated juice is pasteurised for 20 seconds at 185° F., after which it is rapidly cooled to 140° F., put

into cans at that temperature, and the cans closed immediately at a degree or so below that temperature.

Juice produced by this process has been found to be perfectly good after three months' storage at incubation temperature, which is estimated to be equal to eight months under ordinary atmospheric conditions. The simplicity and economy of the process should aid in enabling manufacturers to produce a first-class juice at a price hitherto impossible.

Fruit Syrups

Other exhibits were fruit juices in syrup form. A useful chart was exhibited on the stand, giving the mode of preparation in concise form, as follows:



A Milk Bar which was installed dispensed an astonishing variety of flavoured milk drinks.

Fruit Juices and Concentrates

Some interesting data regarding the vitamin C content of English fruits were exhibited on the Fruit Juice Stand.

Juice.	*Vitamin Content in Mgs. per 100 c.c.*	
	Highest.	*Lowest.*
Strawberry	71	39
Raspberry	37·7	19
Loganberry	26	—
Black Currant	217	135

The 1937 season's work on the concentration of fruit juices by vacuum evaporation and the preparation of fruit wines has given very promising results.

The Laboratories

Members of the staff of the Research Station were in attendance to demonstrate the main points of the laboratory exhibits to visitors.

The main features of the various sections were: Pomology; fruit breeding; plant nutrition; economic mycology; economic entomology; and willows.

In the Home Kitchen were exhibited bottled fruits and vegetables, marmalades, and canned fruit.

What Our Contemporary Says

"Is your package too old? The wise food manufacturer takes stock of this question at frequent intervals. In the final analysis of sales-aids, after travellers, advertising, publicity have played their all-important parts, it is the package itself, in the hands of the prospective buyer, which can convert a 'prospect' into a 'customer'.

Is your package equipped for its task? Is it out of date? Is it due for a change?

As a manufacturer you are always ready to examine new processes. If an invention comes along which will simplify production or improve your product, you are ready and willing to instal it.

As an employer of labour you are always looking for 'new blood'. The young employee of the right type is welcomed into your firm.

When your business premises are getting old-fashioned you do not hesitate to decide on new construction—perhaps shifting your whole factory to a new site and into buildings erected on the most modern lines. You are, in fact, a progressive business man.

It is an odd fact that many progressive business men lag behind in packaging progress. That very lag may be costing them valuable business."

The above constitutes the opening paragraph of the monthly Food Packaging Section which appeared in the May 13 issue of *Food Industries Weekly*. In an extensive survey of modern packaging methods interesting pictures are shown of new display material designed by Carsons, Ltd., of Bristol, introducing their chocolate lines, Milk Shakes and Wine Bottles, which have liquid centres. Another page gives the story of the milk carton up to date and tells of its development for other uses in the food industry. "It is interesting to note that, on the Continent, where this form of container was first developed, its use for milk has never found favour with the public. On the other hand, it has been most successful as a container for other foodstuffs," says a passage in this article. A large number of pictures of new packs and packaging materials is given in what constitutes an invaluable survey.

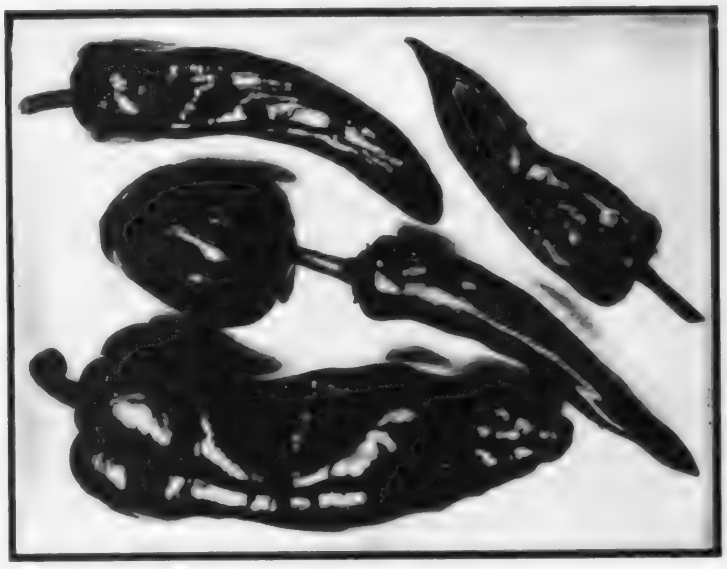
Another interesting recent feature in *Food Industries Weekly* was a detailed description of the new flour packing plant of Messrs. McDougalls, Millwall. This self-raising flour factory is probably unique in the whole world, and the packing is now done entirely automatically. McDougalls were the first to introduce this system.

A further note of interest was the visit of Mr. M. T. Zarotschenzeff, originator of the "Z" pack process for quick-frozen foods in America, to this country. He was interviewed on his arrival by *Food Industries Weekly*, and in an article, "Frozen Foods on the March", details of the latest moves in the introduction of these foods in this country are given.

For Scientists

"As most technical people are aware, there is now in process of formation a society for the study of the Social Relations of Science (S.R.S.). This society will soon call for members, particularly active members, and it will at once commence . . . to probe and examine the many aspects of science affecting mankind and *vice versa*. Here is an excellent opportunity for the individual chemist and scientist to give his aid. I strongly urge support for this new society, the ultimate findings of which may change the whole mode of our existence."—*J. P. Lawrie, in a paper read before the London Section, British Association of Chemists.*

PAPRIKA



Paprika takes many forms. Photo: Sutton and Sons (Reading), Ltd.

H. Stanley Redgrove, B.Sc., F.I.C.

THE FRUITS of *Capsicum annuum L.* have had bestowed upon them a variety of popular names, none of which, however, are really satisfactory owing either to ambiguity or inappropriateness; and in consequence much confusion has been created. The name "paprika" is ambiguous, as it may refer either to the fruits or to the special spice prepared from them in Hungary or in Spain. The name "pimento" or "pimienta" (="pepper") is also ambiguous, since allspice, the dried unripe fruit of *Pimenta officinalis* Lindl., which is totally different in botanical origin, in appearance, and in flavour and consequent use, is also called "pimento". "Red peppers" is inappropriate because the fruits are not always red. They are usually green when unripe, and sometimes yellow rather than red when ripe. "Sweet peppers" is perhaps the best name, although the flavour of the fruit is by no means saccharine, and, commercially, the fruit is classed as a vegetable. Moreover, the name "pepper" does lead to some confusion with black and white pepper, which are different products both derived from *Piper nigrum L.*

Diversity of Fruits

The fruits are most diverse in size, shape, pungency, and even colour. On the basis of these differences, botanists have endeavoured to subdivide *C. annuum* into an almost unlimited number of species. The result has been chaos. In 1898, however, H. C. Irish published, in the *Missouri Botanical Garden*, a masterly revision of the genus, and referred all the various cultivated races to seven distinct varieties of one and the same species.

It is even possible that the perennial plants, noteworthy for their small and highly pungent fruits, known as "chillies", "bird pepper", "capsicums" (these names relating to commercially distinct products), which were referred by Linnæus to a distinct species, *Capsicum frutescens L.*, are no more than perennial forms of *C. annuum*.

Forms of *C. annuum* are to be met with in cultivation in many parts of the world, but it is believed that they all owe their origin to plants indigenous to Central and South America and the West Indies. No plant, perhaps, is more susceptible to climatic influences than is *C. annuum*. A very remarkable instance is provided by the form of *var. acuminatum* Fingerh., cultivated in the Nepaul district, from which the light golden brown, pungent, violet-scented Nepaul pepper is derived. Attempts have been made to grow this pepper elsewhere. The result has been a failure. The fruits lose their special character.

Capsicum annuum can be grown, and to a small extent is grown, in this country. A certain volume of trade is done in both ripe and unripe fruits. It is not, however, an impressive one, and it is rare to meet with stuffed peppers on a menu in this country outside of restaurants specialising in Continental dishes. However, there are signs that the demand is increasing. There is also some demand for canned ripe red peppers for use as hors d'œuvres. Canned red peppers come mostly from Spain, but there seems no reason why British canners should not enter the market providing the demand is sufficient to warrant this.

The present writer considers the flavour of canned ripe red peppers to be exceedingly delicious; but it is a peculiar

Paprika hanging out to dry.

flavour which does not appeal to all folk. However, apart from the question of flavour, there is one recent discovery which, if sufficiently advertised, should soon produce a greatly increased demand for both the fresh and the canned fruits. This is the discovery that sweet peppers are extremely rich in ascorbic acid (vitamin C).

Indeed, so rich are they that they probably provide one of the best sources for the extraction of this vitamin, and are, it is understood, being used for this purpose commercially.

Ascorbic Acid

Banga and Szent-Györgyi, who prepared no less than 3 kg. of pure ascorbic acid from Hungarian grown fruits, describe the (unpatented) process in detail in the *Biochemical Journal*, **28**, 1934, 1625-8. They used the fruit only, stems, cores and seeds being rejected. The process consists essentially in the precipitation of the acid as the lead salt, which is decomposed by hydrochloric acid, extraction by means of acetone, and crystallisation, first from normal butyl alcohol, and then from a mixture of methyl alcohol and dioxane. The yield is about 25 per cent. of the ascorbic acid present in the fruit.

According to these authors, the juice of the fruits contains 2 to 2·5 grams of ascorbic acid per litre. The ascorbic acid content rises to a maximum as the fruit ripens and then drops.

Actually, two types of *C. annuum* are grown in Hungary, a type yielding small and dry fruits used for the production of paprika spice, and one yielding fleshy fruits which are eaten as a vegetable.

Banga and Szent-Györgyi found each type serviceable for the large-scale production of ascorbic acid. The juice of the first type probably had the higher ascorbic acid content, but the proportion of juice was less.

Szanyi (*Természettudományi Közlöny*, **67**, 1935, 527), who carried out a further examination of Hungarian grown fruits, found that the veins, stems and seeds contained only traces of ascorbic acid. Green fruits were found to contain 0·4 g., brown fruits 0·8 to 2 g., and fully ripe, red fruits 1·048 to 2·1 g. ascorbic acid per kg. According to this author, the fresh juice has the high content of 3·160 g. per kg.

Seeing that Banga and Szent-Györgyi found the two Hungarian varieties not to differ greatly in ascorbic acid content, it seems unlikely that juicy varieties grown elsewhere than Hungary should not also be rich in this very useful vitamin.

Paprika Spice

So far as paprika spice is concerned, the method of manufacture is such that the vitamin C content must be negligible. On the other hand, the spice does contain vitamin A, or rather, pro-vitamin, which is dietetically equivalent to vitamin A. The beautiful red colour of paprika is due in part to carotene, but other colouring matters are present, especially capsanthene, a carotenoid pigment allied to carotene, of which the spice contains about four times as much as it does carotene itself.

A third important constituent of *Capsicum* fruits is the pungent principle capsaicin, discovered by Thresh in 1876, though some varieties contain little or practically none of it. The pure substance is so extremely pungent that it is definitely dangerous to handle. Nevertheless, extracts containing fairly high proportions of capsaicin are useful to food manufacturers, and are also employed in the mineral water industry to give "kick" to non-alcoholic beverages.

The capsaicin content is, of course, highest in small, very pungent fruits, such as chillies and the "Capsicum" of the Pharmacopœias. Actually the British Pharmacopœia misdescribes the last product as the dried ripe fruit of *Capsicum minimum* Roxb. The U.S.P. XI, on the other hand, more accurately describes the drug as the dried ripe fruit of *Capsicum frutescens* L. grown in Africa, for it is just the African soil and climate which endows the fruit with its extreme pungency.

The finest ("noble-sweet") grades of Hungarian paprika do not contain much capsaicin, as their method of production is designed to keep it at a minimum, and special varieties of these grades are now manufactured from the "sweet" fruits and described as "capsaicin-free". These are aromatic, but non-pungent. In the old "mercantile" grade, which was of very inferior quality, the capsaicin content rose to as much as 0·85 per cent.

Spanish paprika is also practically free from capsaicin, and finds its chief use as a culinary colouring matter, as it is generally considered inferior in aroma to the Hungarian.

Hungarian paprika is by no means as well known in this country as it deserves to be, and food manufacturers would do well to make greater use of it. Production is limited to the districts of Kalocsa and Szeged, and the manufacture of the various grades is governed by decrees of the Hungarian Ministry of Agriculture. It is remarkable that numerous mis-statements about this spice have appeared in literature, the authors of which, no doubt, have not taken the trouble to acquaint themselves with the decrees.

Making ropes of paprika.

Grading

In my work *Spices and Condiments*, full descriptions of the five grades recognised at the date the book was written are given, together with relevant abstracts from the Decree then in force (No. 83,000 of 1922). These grades were named "noble-sweet", "semi-sweet", "rose", "strong" and "mercantile". The grades have recently been revised by the Decree No. 27,000 of 1936, methods of manufacture modified in certain respects, and new standards laid down. The "noble-sweet" grade has been split into two grades, the superior one being distinguished as "delicacy noble-sweet", and the "mercantile" grade has been abolished.

The "noble-sweet" grades are made from selected, faultless, fully ripe fruits, only the pericarps with the tips removed, and washed dried seeds being employed. The ribs are removed by means of special knives. Pericarps and seeds are mixed in the proportion of 100 parts of pericarp to 75 parts of seeds or 45 parts of seeds in the case of the "delicacy noble-sweet" grade.

In the case, however, of varieties made from "sweet" as distinguished from "spice" fruits, the ribs need not be removed nor the seeds washed.

The maximum ash content is fixed at 6½ per cent., and at ½ per cent. for acid-insoluble ash.

Spice made by this method failing to reach requirements in ash-content, colour, aroma, taste, etc., but superior in these respects to the following grade ("rose"), is graded as "semi-sweet" paprika. This is the variety mostly employed for culinary purposes (for example, making goulash) as distinguished from use at table as a condiment, for which purpose the superior grades are preferred.

"Rose" paprika is made from ripe, healthy fruits, the peduncles and calices being removed, though small particles of these are permitted. The ribs are not removed as in the superior grades, but broken particles remaining in the spice are removed. The maximum ash content allowed is 7·2 per cent., acid-insoluble ash, 0·7 per cent.

The last grade, "hot" or "strong", is made from defective fruits deprived of stalks and calices, to which may be added rips, points of fruit and cores remaining over from manufacture of the finer grades, as well as seeds. A maximum ash content of 10 per cent. is allowed, and 1·5 per cent. for acid-insoluble ash.

"Vitapric"

Mention should also be made of "Vitapric". This is a Hungarian conserve of paprika fruits of a marmalade-like character, which seems to be hardly known at all in this country. It is preserved with benzoic acid, and marketed in small tins for culinary use. It is stated to contain 0·40 per cent. of vitamin C (ascorbic acid). This would appear to be by no means an overstatement, for, according to Becher (*Mezögazdasági Kutatások*) the product contains from 0·45 to 0·46 per cent. of ascorbic acid, as compared with 0·18 per cent. for paprika purée and 0·02 per cent. for lemon juice. The "marmalade", if one may so call it, is bright red in colour, pleasantly aromatic in odour and flavour, and somewhat pungent. It is recommended for spicing a variety of dishes of a savoury type, to which it should be added after cooking, as otherwise the ascorbic acid is liable to be destroyed.

Indeed, it seems that the lemon can no longer retain its proud position as the best source of vitamin C; but, outside of Hungary, full advantage of the superior character of the sweet pepper does not appear to have been taken by food manufacturers, in spite of the fact that, here in Great Britain at any rate, the consuming public is fully vitamin-conscious.

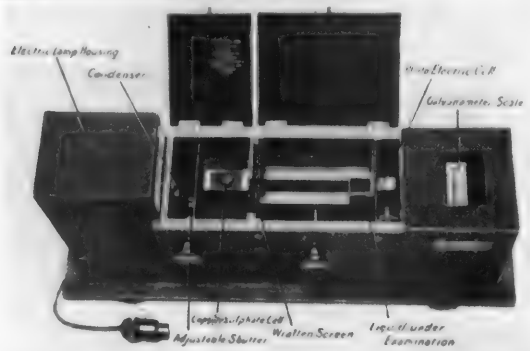
In conclusion, I wish to thank Messrs. Leopold Reitzer and Co., of Szeged, and E. Holt, Esq., of the Royal Hungarian Office for Foreign Trade in London, for kind assistance in supplying samples and valuable information.

MEASUREMENT

A Colorimeter for Automatic Readings

An interesting new development in the measurement of colour is the Bolton and Williams Colorimeter, which was designed to give automatic readings independent of the aural variations of the individual observer. One of the models has been produced for opaque surfaces; accuracy is obtained by the removal of the heat rays so that only the light rays, to which the eye is sensitive, register. The infra-red rays are removed by passing the beam of light through a filter cell containing 1 per cent. solution of copper sulphate.

The rays of light from the lamp in a lamp house at the side are concentrated by a mirror and pass through a glass-sided cooling tank, which is kept cool by a slow stream of water. The colour to be tested is clipped into a holder, which is held by a swing plate at the back of the instrument. An opposing swing plate holds a standard white surface, and when either of the plates is in position it is illuminated by the light beam from the lamp. The light from the colour plates passes through the cooling tank and the infra-red rays are removed by the filter cell. The intensity of the light is controlled by an adjustable shutter. By means of a series of selected colour filters the ray of light is transformed into pure colour light of the desired wave length, which falls on a photo-electric cell connected to a registering galvanometer, with its scale visible through a window at the top of the instrument. Direct readings are thus obtained, and curves can be plotted from any colour desired. The automatic nature of the instrument makes comparisons possible from figures and graphs plotted by different observers. The makers are the Technical Research Works, Ltd., Milner Street, London, S.E. 3.



Model "B" Colorimeter. Patentees, E. R. Bolton and K. A. Williams. British Patent 450,576.

* * *

The G.E.C. Photo-Electric Colorimeter described opposite.

The K.B.B. Fade-Outfit

The K.B.B. Fade-Outfit for accelerated tests on the fastness of colours yields results in a very much shorter time than exposure to natural sunlight. For example, ninety-six hours' test in the apparatus is equivalent to about fourteen days' full June sunlight in this country, and the variability of the power of the sun throughout the year means that ninety-six hours in the K.B.B.

Fade-Outfit of the K.B.B. Fugitometer is equivalent to about two months' natural sunlight in winter.

The Fade-Outfit provides a standard source of radiation with a spectrum as nearly that of the sun as any artificial source. The radiation source employed in the apparatus is a special pure carbon arc lamp arranged to produce a long arc enclosed in a globe of special glass of the Pyrex type. The apparatus is arranged so that all the samples are at the same optimum distance from the arc, which arrangement allows of repeatable tests.

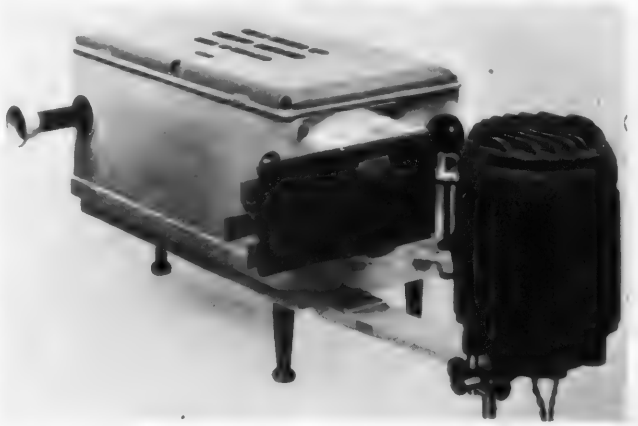
The Fugitometer is similar to the Fade-Outfit, except that it provides in addition that the samples can be tested in closed metal sample boxes through which humidified air is passed.

The K.B.B. apparatus is made by Kelvin, Bottomley and Baird, Ltd., of Cambridge Street, Glasgow.

The Donaldson Trichromatic Colorimeter

This colorimeter, made by Adam Hilger, Ltd., was designed at the National Physical Laboratory as an accurate colorimeter free from moving parts. In construction it is simple and may be used on either alternate or direct current. Transparent or opaque coloured materials may be handled by the instrument, and the readings obtained may be converted to C.I.E. colorimetric units.

The instrument is of the visual type and measures the colour by comparing the colour to be matched with a combination of known colours in known proportions. A diffusion box is used into which a composite beam of variable amounts of green, red and blue light is admitted; this can be varied at will. By means of this diffusion box the operator is able to produce a colour of known specification which can be matched to the colour under test.



The Donaldson Colorimeter made by Adam Hilger, Ltd.

The design of the colorimeter is such that in normal use no focusing is necessary, but where it is necessary the observer can adjust the field of the instrument to suit his sight. A colorimeter lens can be added at will if the sight of the observer requires this.

* * *

The Lovibond Tintometer.

Measuring Colour

The Lovibond Tintometer has for many years been well established in the food trade in connection with the standardising and measure of colours. The accepted method of judging the tinctorial strength of caramel, for example, is by measuring the colour of a 0·1 per cent. solution in a 1-inch cell, using the "52 Series" brown glasses. Similarly, chlorophyll colour strength is assayed in a very dilute benzene solution in a ½-inch cell and the colour expressed in terms of the Lovibond yellow and blue glasses.

Other well-established applications in connection with foodstuffs which may be mentioned are:

Judging the colour of flour (Jago, Grant and other authorities) and of vanilla extract and vinegar.

The colour of flour pulp for jam making and that of such canned products as salmon, tomato purée may be measured by the Tintometer.

In the dairy industry the colouring strength of annatto, synthetic butter-colourings and a number of other products may be determined.

* * *

G.E.C. Direct-Reading Photo-Electric Colorimeter

The General Electric Co. of Magnet House, Kingsway, London, have produced a new and improved form of photo-electric colorimeter. The chief advantages of the new G.E.C. instrument, besides the fact that it dispenses with the observer's visual judgment, are its high sensitivity and robustness and the wide range of quantities of solution which can be measured—*i.e.*, 1·0 c.c. to 100 c.c. Another important feature is provided by the direct reading scales showing the absorption and extinction values. The rectifier photo-cells employed have a much larger output than that obtained from alkali cells, and there is, therefore, a considerable gain in performance.

Briefly, the G.E.C. photo-electric colorimeter comprises a lamp and two similar glass containers for holding the liquids, together with a pair of matched photo-cells to receive the light through the containers. There are two methods of using the instrument—by comparison or by deflection. In the first method the absorption of one of the liquids is known, and the relative absorption of the other is determined from readings on a calibrated galvanometer. This method is claimed to give better accuracy than the deflection method and avoids the necessity for standard curves, but it is not so quick.

The deflection method is employed with highly coloured or dull solutions, which give deflections over ten divisions, as it possesses the advantage of enabling quick work to be carried out and also has low sensitivity to disturbance. Here the least sensitive adjustment of the galvanometer is used, and so fluctuations in the brightness of the lamp are scarcely noticeable. The centring of this lamp is easily carried out as the zero point is very stable. Before measurement both containers are filled with 100 c.c. of water or solution medium and placed in the apparatus, and the instrument is connected to the supply; a period of ten minutes or so is then allowed for the heating of the lamp. After adjusting the zero the right-hand container is replaced by another containing the solution to be tested; a reading is then taken.

COLOURS, FLAVOURS AND NEWS

Essence Distilling Plant at Zaandam, Holland

The illustration is one of the essence distilling-rooms at Polak and Schwarz (England), Ltd., at Zaandam, Holland. This firm have ramifications in France, Germany, United States of America, and Italy, and their range of essential oils, aromatic chemicals, flavouring essences, flour oils and colours is well known.

* * *

Colouring and Flavouring Foods

The Scottish Flavour and Colour Co., Ltd., manufacture a full range of flavours and colours suitable for use in sugar and flour confectionery, also for ice-cream and aerated waters. In addition, a wide range of special products suitable for bakers and confectioners are being made at the company's works. These include cream fillings, special nut pastes, marzipan and almond pastes. "Plast-o-Paste", which is an entirely new line, is revolutionary as far as cake covering is concerned and has had a wonderful reception from confectioners.

The company's policy is to supply modern products to confectioners; continuous research is undertaken by the company's chemists to this end.

* * *

Edible Colours

Williams (Hounslow), Ltd., have issued an excellent little booklet containing a shade card of all the colours mentioned.

In this book first of all figure the names of products and the range of colours which can be used in connection with them. A table showing the fastness properties of the colours, together with an indication of the countries in which the use of these colours is permitted, enable the manufacturer to glean a tremendous lot of information at a glance.

Messrs. Williams may be congratulated on the production of such an excellent booklet.

Drydex Flavours

These flavours are a speciality of A. Boake, Roberts and Co., Ltd., and are used by manufacturers of powdered foodstuffs such as jelly crystals. It is claimed that in use the flavour is absolutely fixed and is not available until the protective envelope is washed away.

Another speciality which is described in a leaflet issued by the makers is represented by the Olio series of flavours which is advised for use in all foodstuffs containing fat. These Olio flavours are completely soluble in oils and fats, and it is pointed out that it is logical that flavours which have to be incorporated in mixes containing much fat should be themselves fat soluble.

* * *

Oleo-Resins

A large range of Oleo-Resins including Ginger, Capsicin, Sage, Thyme and Bay Leaf, are among the flavouring range of products manufactured by Stafford Allen and Sons, Ltd. These products contain the entire flavour of the herb, whereas the essential oils only contain the volatile fractions.

So far as essential oils go, a large variety are made, and this firm is especially proud of their Clove Oil. The usual range of soluble flavouring essences are manufactured and a speciality has always been made of toffee flavours.

Caramel

W. Ambrose and Co. have specialised in the production of caramel for 48 years, and their products are used by every trade which demands the incorporation of caramel in its manufactures.

There are numerous and varied types of raw sugars used in the trade, and it is only by having an extensive knowledge of the characteristics of these materials that the many qualities of caramel can be produced to completely satisfy the multitudinous preparations in which it is employed. The two principal factors which have to be considered are the required colour value and the flavour (if any) which has to be imparted to the finished article. The scientific blending of raw sugars plays a great part in the latter factor. Only good grades of sugar can be burnt to produce a high colour value, and the avoidance of harshness and acridity necessitates very careful control.

The following represent some uses of caramel: brewing, pickles and sauces, gravy salt and browning, wines and spirits, confectionery and cakes, essences and mineral waters, medicines and drugs, perfumery, vinegars, etc.

* * *

Alcohol Free Flavours

Arthur Whittaker of Manchester specialises in eliminating expensive alcohols from flavours, and his chief line is Vanoleum, a vanilla flavour soluble in water.

Sesquito is another flavouring principle which can be added to alcoholic essences to fortify them, or to essential oils. Other products are Excelsior Extracts, which are soluble essences concentrated eight times.

* * *

Materials for the Modern Brewery

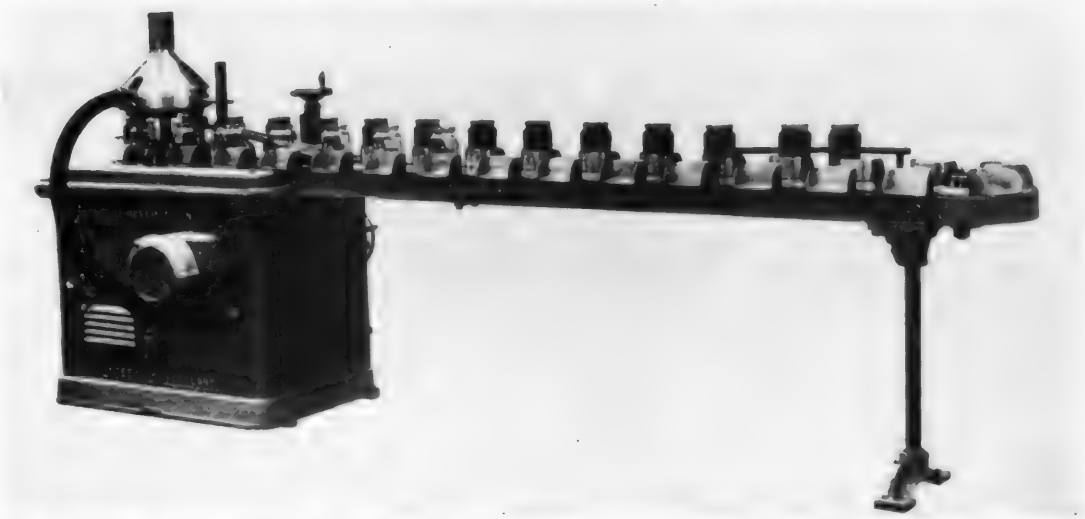
Gonville, Jarvis and Co., Ltd., are makers of caramel extracts and kindred products, and have concentrated on the former material for over a quarter of a century. Their "B.M.C.", "Hi-o-Tint", "Oatex" and "Maltexvert" brands are also well known. Stouts using these specialities obtained first prizes in open competition at most of the recent Brewers' Exhibitions.

* * *

C. W. Field, Ltd.

This firm distils a range of flavouring essences and essential oils and are also manufacturing chemists and spice grinders.

A New Jam Filling Machine



We have received some notes on the new Patent Automatic Continuous Jam Filling Machine, which is being produced by Robert Kellie and Son, Ltd., in readiness for the approaching jam season. This machine, Type 4 FP Automatic Motor-Driven Two-Speed Plunger Type Filling Machine, which is specially designed for jams, jellies and marmalades, is also suitable for any product that can be pumped, such as mayonnaise, syrup, sauce, etc. It is claimed for the machine that it will fill more accurately and more cleanly than has ever been possible before, and that waste is eliminated. Whole fruit jams, such as strawberries, etc., are not crushed. Cleaning and setting is instantly accomplished. Operation is continuous.

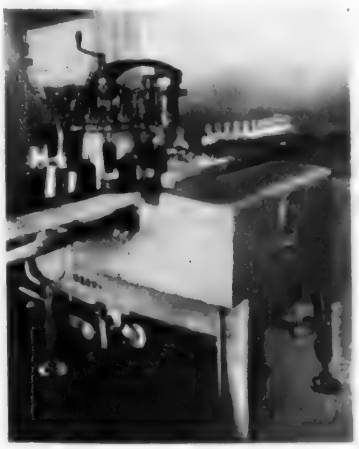
The patent micrometer stroke regulator measures and regulates the exact amount to be filled, and this is done without stopping the machine. The stroke of the plunger is automatically adjusted by the hand wheel. This micrometer adjustment is a great labour-saving advantage. All mechanism is entirely enclosed, and the machine can be washed down with a hose without any possibility of wetting the motor or pump mechanism. Accuracy, cleanliness and speed are the features that have been incorporated in the design of this filling machine.

The illustration shows the extended model having 31 jar carriers for 2-lb. jars, each of which is provided with removable adapter for 1-lb. jars. The standard machine is usually provided with 19 jar carriers, but machines can be supplied with any odd numbers of carriers ranging from a minimum of 19 and increasing by groups of six, thus: 19, 25, 31 and upwards as required. The machine is driven from a ½ h.p. reduction geared motor unit to suit client's electricity supply with two-speed quick-change gear controlled by a hand lever and clutch, all of which, together with the pump mechanism, are totally enclosed within the framework of the machine.

* * *

Coffee Filling

The latest production of Albro Fillers is a vacuum operated rotary



coffee essence filling machine. It has been specially made to fill Branson's "Spade" Coffee Extract into all their sizes of bottles. Fitted with ten filling nozzles it has a maximum capacity of 250 doz. per hour. The coffee is supplied by gravity from a bulk tank, this in its turn being fed from pans on the floor above. Among other refinements the machine has a built-in rotary vacuum pump and automatic cut-outs on the feed and discharge wheels to reject faulty bottles. Cleaning is simple and quick. The machine can be adapted to other liquids and can be made in all sizes from 6-head to 24-head models with a 120-bottle-per-minute output.

* * *

Butrol and Butrol-40

These products are butter flavours and are used for margarine and for confectionery. In practice, a flavour that will produce an exact equation of fresh dairy butter in cakes and biscuits gives an entirely different register when used for the flavouring of toffees and butterscotch.

Proprietary Products, Ltd., claim that the creamy elements which are a feature of butter are faithfully reproduced in their new products "Churnol—B" for use in cake and biscuit manufacture and "Churnol—C" for toffees and butterscotch.

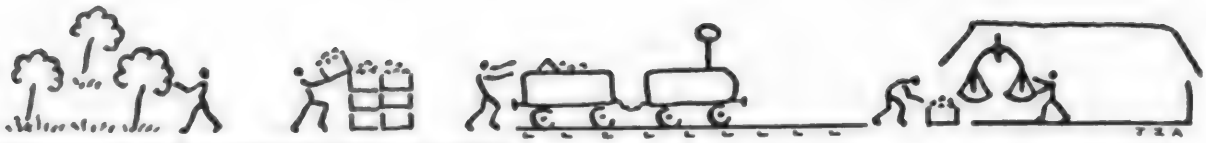
* * *

Vanilla Flavours

The flavour of vanilla is so delicate that most metals are injurious to its taste and aroma. One firm, after a series of tests, selected Inconel for storage tanks and other equipment handling the extract because this alloy caused no harmful effects. For vanilla percolators Monel metal made by Henry Wiggin and Co., Ltd., is often used.

* * *

A. Connell and Co., Ltd., of 10, Phœnix Place, Mount Pleasant, W.C. 1, are the London agents of a Sicilian firm who are starting the manufacture of frozen lemon juice.



The Canning Line (with acknowledgments to Miss Joan Z. Atkinson).

WHAT'S WRONG WITH

The Author, a Past-President of the National Canning Council, presents his views on the past, present and future of the British Canning Industry.

NO STUDY of the present can be adequate without some echo of the past or vision of the future, and particularly is this so in canning at the present day. With due deference to several well-known pioneers, this industry before the war was so small, and lay in so few hands, that its past really starts from about 1926 onwards, when several people awoke to the fact that an increasingly can-minded public, partly educated to this by the war, need not necessarily continue to satisfy their needs at the hands of competitors in U.S.A. and elsewhere.

Finance

After the initial venture, coupled with some official support from the Ministry of Agriculture, the advancement of this new industry fell out of the hands of those who could safely be trusted to take a nurse's care of its child and frustrate any desire to run before it could walk into the hands of financiers and capitalists who saw a ready outlet for surplus capital with a profitable return. Unfortunately, nobody succeeded in damming the other end of the pipe, and the capital, after an exciting period of over-production, high prices for raw material caused by unwarranted competition, and rotten marketing, has slowly seeped back into the ground from which it originally came.

Such a statement requires some explanation and confirmation, and a short summary of the state of affairs from 1928 onwards will give good cause for reflection.

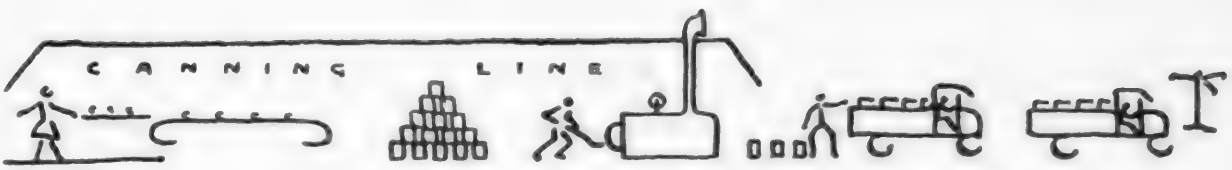
In the first place, there was no co-operation between canners, nor was the ground prepared beforehand, so that canneries were erected in areas where the fruit or labour was difficult to get, and, owing to the absence of specialised knowledge, not only was there no attempt at encouraging growers to make long-term contracts for the growth and supply of the right sorts of fruits and vegetables, but frequently potential supplies were reduced by a very short-sighted policy of paying as little as possible for the grower's product.

An excellent instance of this lies in the history of the loganberry, which was at first obtained at about £28 to £30 per ton, a price which allows the grower a small margin of profit. As a result, quantities were planted, the grower, in my view, never having been backward in taking a risk if he saw a possible profit. The increased tonnage became available two years later and canners allowed the price to drop to £18 to £20 per ton, at which the grower showed a definite loss, not only of cash but of goodwill. The concrete evidence of his cash loss has been shown in a steady reduction of acreage until last year the same fruit was sold in many instances at £35 to £40 per ton. How can an industry, which in the end depends entirely upon the goodwill of the housewife, expect to prosper if in one year her can of logans is going to cost her 7½d. and at the next purchase (perhaps a year or so later) she is asked 9½d. or 10d.?

It is fully appreciated that variation in certain crops, such as plums, does produce a wide range in prices, but here again a wise policy of paying the grower rather more than the normal and absurd glut price in times of plenty would enable the canner to buy rather below the market in a year of shortage.

Over-Production

In the second place, as a result of short-sightedness, over-production became a constant source of weakness in sales, and the English canner has only himself to thank for the present state of affairs, in which a contract with the grocer is rarely enforced. After all, the English grocer or distributor has been brought up on American terms when he pays cash against documents and when there is no question of sliding out of a contract because the price of peaches has dropped 1s. a dozen. But if plums drop by the same amount, due to some over-packed canner unloading at a time when the market is not ready to absorb extra supplies, what happens? The grocer at once points out that X's plums of a similar quality are available at 1d. or 1½d. per can less than yours in his window, so he cannot sell yours in competition. The grocer may be prepared to keep his end of the bargain, taking the rest of the contract we will assume he made in the early autumn, in which case your plums sit in his shop, slowly deteriorating and waiting to meet you when you next try to sell him fruit, or, more likely, you as the producer take the more obvious course of cancelling the contract or reducing the price to the lower level. In no case can the grocer be blamed, because the initial fault lies with the canner. Until some



BRITISH CANNING TODAY?

H. D. GREGSON

co-operation and planned packing and sales scheme is produced this evil will become worse and worse, to the final extermination of the majority of the home canners.

Quality of Goods

In the third place, during the fatal early years of canning, not only was over-production rife, but the matter was aggravated by the over-production of poor quality goods as well, which again affected the market and the ultimate consumer, who had been educated and bred on the peach standard. Finance was badly to blame here: expensive plant had been installed, in itself a mistake, and as, to make it pay, a given number of cans must be packed, it is small wonder that the quality went down. The wisdom of using expensive automatic plant for canning is doubtful, in my view; the policy comes from the same place as the peaches, but there a man, unskilled, will be paid at least 20s. per day against 10s. in England, and many machines that will and do pay in U.S.A. have no hope of paying in this country, and, furthermore, are tempting and expensive toys to have lying around in the cannery asking mutely to be run to capacity.

Vision Needed

In addition to the various major and fundamental mistakes which this industry has had to overcome in the past, a very serious lack of vision among the leaders has been an added handicap, and this must be laid to their account. Here was a relatively new form of food, having all the assets of originality and freshness and furthermore providing a very easily understood although partial solution to the unemployment problems of several basic industries. Yet facing it were the well-entrenched, highly organised foreign and colonial competitors. Surely their first action should have been to present an united front and to use that union to bring pressure to bear upon the Government to gain some form of recognition and protection. This has been secured in other industries, notably in wireless and motor-cars, both, in a way, luxuries. These lacked, furthermore, such a good argument as that of the canning trade, whose direct assistance to agriculture, in addition to the steel and tinplate manufacturers, should have been made to weigh heavily in the official scales, at a time when large sums were being spent by various official bodies to encourage the purchase of home produce.

National Mark

Even a scheme like the National Mark was not adopted by some of the larger canners, although any movement to help the canner in improving the very doubtful quality of some packs surely merited the wholehearted support of the better packers, without loss of goodwill with the public. Advertising schemes have been broached and sponsored, again to fall by the wayside on the stony ground of petty differences of policy, leaving this vital part of sales, in the end, to the everlasting shame of the canners, to be carried out energetically by an organisation interested in the supply of the empty containers.

Heaven helps those who help themselves, and on this score there is little hope of the hereafter for this industry. A visible sign lies in the hands of the trade advisors at present negotiating a treaty with U.S.A., as a result of which an officially inspired newspaper, the *Daily Telegraph and Morning Post*, prophesies a reduction in the existing duties on canned fruits imported into this country. Such a reduction means also that additional efforts will be made by colonial producers to sell their fruits here in competition, and while some natural increase in consumption, as a result of cheaper prices, will result, it is obvious that the home industry will be the heaviest loser. Had the English canners been a well-organised and loyal body, with a prominent voice in Parliament, supported, as well it ought to be, by agriculture, such a pitiful state of affairs would not now exist. The blame for this must rest upon the shoulders of those who have preferred to pursue their own selfish paths to the detriment of the whole.

Selling Prices

Worst of all, there is the failure of every attempt at agreement, even at ridiculously low prices, of the selling price of such a regular and popular commodity as process peas, a product that can be packed at will and where the canner is not in the unpleasant position of possibly suffering from excessive stocks. Furthermore,

these peas, even if canned, do not deteriorate as rapidly as some forms of canned fruits in the unlikely event of the price agreement being boycotted by wholesalers or retailers. The results of the last decade are that we find a tottering industry instead of a strong, well-organised body, at a time when it is publicly admitted that no form of food storage is better able to withstand the effects of gas.

We find that morally and actually the English canner has let down his prime producer, the farmer, as evidenced by a reduction in the acreage of strawberries, gooseberries, loganberries and plums, instead of fostering this essential adjunct to our trade.

We find that financially the power has passed from him to the middleman and grocer, in that the canners cannot agree, the forty or so that are left, to maintain reasonable prices, even when the opposition camp, the buyers, number many thousands and are consequently far less able to combine in any concerted deflationary movement.

We find also that owing to the financial difficulties mentioned above, little or no reserves have been created, advertising has been inadequate, and the consumption of English canned fruits in particular amounts to the pathetic figure of about one can per year per head of the population of these islands, with only a very few canners enjoying any public goodwill at all.

We find that the container costs roughly 50 per cent. of the whole cost of our principal product, the process pea, and console ourselves that perhaps this high cost is partly due to the advertising indulged in by the can-maker to stimulate the sale of the finally filled can and that if enough cans are made and used perhaps the price will come down. We find lastly, and most pathetically, that after all these bitter experiences the suicidal race to bankruptcy is still going on, as fast as ever, and nothing short of a Marketing Board, or some other form of outside control, the last hope of the destitute, will stop it unless the canners themselves put their house in order.

Remedies

Enough has been said to suggest that this industry has been and is suffering from very severe growing pains, most of them being engendered by carelessness or lack of forethought. Fortunately many of the defects can easily be remedied given the goodwill of all the members. In addition, other production defects lie within the scope of every canner to adjust and put right, and finally we have records of similar phases of depression at other times in other parts of the world which have yielded to treatment and from which we can profit. To start at the beginning, the raw material, in our attempt to suggest improved conditions, is a mistake in this case. That can and will come later. The fundamental and obvious point of coming to grips with the difficulties with which we are surrounded is to get complete unanimity among canners, coupled with loyalty to a governing body. If the National Food Canning Council or the Fruit and Vegetable Canners' Association of Great Britain cannot command the support of all canners interested in fruit and vegetable canning in this country then some other body must be formed that can and does speak for the whole. I firmly believe that such an alternative would be most regrettable and unnecessary and feel sure some formula can be found to embrace all canners in one or other of the existing folds.

After all, the values of co-operation are so obviously greater than the present cut-throat system that all must see the advantages to be gained and, if necessary, be prepared to sacrifice something to achieve other things of greater value.

The case for co-operation and common counsel can never have been stronger than at present, if only by virtue of the need for enabling the Government to treat with one body, and one body only, in the event of national emergency, and, for that matter, to receive advice from one body.

Standardisation of Quality

Having obtained one corporate whole, the scene is speedily set for some degree of standardisation of quality, the lodestone of the present age. The buyer is used to thinking in terms of "fancy", "choice", "standard", etc., with their different qualities of fruit as well as strengths of syrup, and we have more than reached a somewhat similar stage in this home industry but without the advantage of a series of recognised trade descriptions. Indeed it is easy to buy cans of plums with "choice" on the label, but which contain syrup and fruit well below "standard", all for the sake of being able to masquerade under the cloak of a gorgeous label at the humble price of 6d.

There is no objection to putting smallish plums in a weakish syrup to retail, at a very low price, in large quantities to the poorer public, but there is a very real objection to any attempt to disguise the lower quality by the use of an already accepted trade term denoting something better. Equally obnoxious is the use of highly decorative pictures of garden peas, with flowery language, cleverly calculated to suggest the immaturity of the contents, when in actual fact they are harvested peas and possibly of foreign origin.

If this industry can gain the united front that is so much to be desired it must have a considerable effect on those to whom we are indebted for the distribution and sale of canned goods. No grocer likes being forced to go back on a contract, or, alternatively, to suffer because, through no fault of his own, implementing the contract will cause heavy loss to him. Equally so, honest labelling will help him to maintain his own goodwill with the purchasing public, and it is obvious that firmness in prices and contracts must do the canner considerable good. It is high time some agreed standards were introduced and rigidly adhered to, as the whole industry is laying itself open to widespread mistrust. It would not be difficult, with the assistance of the Campden Research Station, to adopt a set of rules that was recognised by the trade and parallel with those already existing in U.S.A. and elsewhere. With the standardisation of quality would come standardisation of minimum selling prices, leaving the path open, on the one hand, to expenditure on advertising to combat overseas competition, and, on the other hand, to some semblance of a long-term policy with the producers of our raw materials.

A tomato canning factory.

Canners and Growers

The foregoing outlines the principal causes of trouble in this industry, together with some suggested remedies. After closing the ranks of the canners into a solid phalanx, and standardising quality, the next step undoubtedly lies in the adoption of a long-term policy with the growers, both in planned production of the right crops and varieties and at prices that would enjoy some rigidity from season to season, even if forward contracts as at present understood were not embraced. Personally, I am not in favour of rigid growing contracts over a number of years, as apart from seasonal fluctuations of crops the very times we live in do not tend to produce anything static; with foreign exchanges suffering violent spasms and foreign policies equally violent changes, the home producer should not be expected to bind himself too far ahead to any fixed production cost. This does not, however, militate against a policy of contracting for a portion of a grower's crop between certain variations in price dependent upon season, with a policy of paying rather above the current prices in times of glut to offset the famine prices which are at present paid in years of shortage.

Furthermore, some co-ordination between the canner and the grower is reasonable to expect in the future, as it is now possible, thanks to the figures of production and sales collected through the Bank of England for several years, to arrive at a very fair idea of present annual production and sales of English canned fruits and vegetables (although some allowance would have to be made for forced sales that have done producer and grower no good).

Added skill in production both of cans and the finished article also make the risk of carrying forward stocks far less onerous than before. Furthermore, provided the Bank of England figures are honestly supplied by the individual canner and as honestly interpreted by the combined body of canners or its controlling committee, then this committee should be authorised to make periodic statements to canners and the trade generally and advise on production figures.

Also, of course, nature has a way of its own of levelling out supplies, and some form of canned fruit pool, financially strong, should be devised to prevent the usual end-of-year unloading which has so materially weakened the markets every spring, although it is the best period of public consumption and demand.

Co-operation with Growers

The present system, widely in use at present, of buying fruit from the cheapest source cannot, in the end, be as wise as a policy of consistently supporting a regular circle of growers, who can be educated into the canner's special needs, both as regards size, colour, and ripeness of the fruit. This policy can, and I believe will, in time be carried a stage further, thanks to the laws of economics. Certain districts are peculiarly noted and suited for the production of certain fruits and vegetables. Notably we find at present that Scotland seems to be able to produce the best and cheapest raspberries; similarly Kent leads in cherries, Worcester in the yellow egg plum, Huntingdon in celery, etc. Of course, the Wandering Jew (but not execrated) is the strawberry: this seems to become popular in a district and then gradually, through some cause as yet undiscovered, becomes a poor cropper and shifts to another area; but this is the exception rather than the rule, and research into the reason should be encouraged by all canners.

Given certain canneries concentrating on certain products the result will be cheaper and more uniform production to the benefit of all. An obvious example lies with French beans, which at present are produced by perhaps 25 factories, making the use of expensive mechanical graders and end snippers a very doubtful economy, whereas one or two factories, with a study of

VITAMIN RESEARCH*

THIS report embodies the Department of Pharmaceutical Chemistry, Nutrition, Pharmaceutics, Pharmacology, Pharmacognosy.

Some work on the Interaction of the Vitamins is reported by Bruce and Phillips.

Interaction of Vitamins

It has previously been shown by workers in this laboratory that the responses of rats to graded doses of one vitamin were smaller when the amounts of other vitamins in the basal diet were small than when these other vitamins were present in large amounts—that is, the curve of response to graded doses of a vitamin was steepest when all other vitamins were given in ample amounts. It then seemed advisable to find out whether an excess of any one vitamin given in the basal diet or possibly in the dose of test substance would affect the response to the vitamin which was being determined.

It has now been shown that the response to a small dose of vitamin D (with the use of Steenbock's diet 2965 and the "line-test" method of measuring the effect) was not influenced by giving, at the same time, excessive doses of vitamin A, B_1 or C. It has also been shown that the weight response to a small dose of vitamin A was not influenced by giving a graded series of excessive doses of vitamin D. Thus the full effect of a small dose of one vitamin is only obtained when all others are present in abundance and excessive amounts of the others do not enhance further the effect of a small dose of any one vitamin. There is, therefore, no "sparing action" of one vitamin on another, and, in assaying vitamins A and D at least, it is unnecessary to consider the possible presence of another vitamin in the substance under test, provided the basal diet is adequate. (Bruce and Phillips.) Bruce, Kassner and Phillips report work on the Stability of Vitamin D. It was quoted that deterioration was slight in the few cases where any could be detected. In most cases no loss of activity was found. Coward, Kassner and Waller experimented on rats to test the finding of Simpson and Wood that a daily supplement of Virol produced a greater increase in height and weight in children than doses, equal in calorific value, of either cod liver oil or halibut liver oil plus a little milk. During the experiments it was apparent that the diet of the rats, which was made as much like the "poorer-class" diet as possible, that is, it consisted of large amounts of white bread, with small amounts of margarine, butter, potatoes, cabbage, meat and sausage, jam, brown bread, tea, milk, etc., was found to be lacking in the elements needed for calcification—*i.e.*, calcium and phosphorus. As a result of experiments on rats, it was evident that the general mixed diet of the poorer class was seriously deficient in bone-forming elements, and that for the rat at least this deficiency could be made good by supplying inorganic salts of calcium and phosphorus. A further calculation showed that from his ordinary "poorer-class" diet and a liberal allowance of a drinking water such as is supplied in the Bloomsbury district, a child receives only about half the amount of calcium he requires.

Dr. H. Lindholm, who was a visiting worker in the Nutrition Department during the year, carried out a preliminary experiment showing that daily supplements of 10γ flavin to a diet containing abundance of vitamin B_1 but very little of the other B vitamins did not produce an increase in weight, though it prevented loss of weight and death. Lindholm, Laursen and Morgan worked on the Simplification of Vitamin B Test.

A note is given on the Vitamin D Potency of Cod Liver Oils in view of the fact that the vitamin D value of many oils sent to a laboratory for examination were found to be below the minimum value adopted by the British and United States Pharmacopœias for medicinal oils. Many of these oils were, however, intended for cattle and poultry feeding and as such would be valuable material. The following table gives the average values of samples examined in the laboratory:

Year.	*Period.*	*No. of Samples.*	*Average Potency.*
1937	Jan.-March	12	88 units per gm.
,,	April-June	13	114 ,, ,,
,,	July-Sept.	20	127 ,, ,,
,,	Oct.-Dec.	17	100 ,, ,,

* Annual Report of Research Work, 1937, The College of the Pharmaceutical Society.

What's Wrong with British Canning Today? (Concluded from previous page)

strains and varieties, could make considerable economies and so widen this market considerably.

While advocating close contact with the headquarters of the N.F.U., far closer than at present is the case, in matters of common interest and policy the local branches also should be approached by the individual canner. With regard to this, I wonder how many farmers have seen the film on plum canning shown two years ago at the Annual Convention? At present the canner does not usually adopt this method of gaining contact with the grower, possibly because he would be one among many at the meeting; but provided sources of friction, usually on the fruit price question, are avoided, much good can be done in advising the grower as to what to plant, and what not to plant, and generally discussing the mutual problems which so frequently arise.

Co-operation—the Final Word

I have attempted to depict the present scene as I honestly see it. I fully realise that much thin ice has been skated over and that the problems facing this industry are large, but I am convinced that only by the closest co-operation between canners will a solution be found. That a solution will have to be found soon is certain, as there is no doubt that as one canner drops out so another will take his place, when the time is ripe, and meanwhile the industry is jeopardising its precarious position in the eyes of the distributing trades and the consumer.

NEWS FROM THE INDUSTRY

New Food Secretary

It is reported through the *B.O.T. Jnl.* that Mr. R. H. King has succeeded Mr. J. R. Willis, M.C., as Secretary of the Food Council, New Public Offices, Great George Street, S.W. 1.

* * *

Big Danish Exhibition

To celebrate the 150th anniversary of peasant emancipation Denmark is organising a great National Agricultural Exhibition at Copenhagen this year from June 17 to 26.

Announcing this national event at a luncheon recently at the Danish Club, London, Count Reventlow, the Danish Minister to this country, said that never before in the history of his country had such a comprehensive and ambitious exhibition been organised. It would show for the first time the history, social condition and scientific efficiency of Danish agriculture. King Christian X had given the undertaking his patronage, and would perform the opening ceremony.

* * *

Healthy Growth of Canning Club

The Canning and Food Industries Club has settled down to a slow, steady growth. Each meeting brings small but significant additions to membership, and it is satisfactory to note that in many cases the guests at one meeting are members at the next.

The dinner held at the First Avenue Restaurant on Tuesday, April 26, was attended by most of the old-timers, although there were one or two familiar faces missed, among whom was that of President Maurice Batchelor, whose place was taken for the evening by John Leno, midst general acclamation.

After the loyal toast, the Chairman welcomed the new members, Messrs. Alastair McLeod, Dunglington and R. J. Wheeler. All responded and signified their gratification at their election.

Roland Arnison welcomed the guests in his customary happy manner, and the replies were couched in terms highly flattering to the Club. The guests were: Messrs. Benwell, Brand, Dalzell, Dodsworth, Dreshfield, Ivey and Sheppey.

The address, which is becoming a useful and interesting feature of the Club's meetings, was given by T. W. Jones, who took as his text the Ottawa Agreement and gave instructive facts and figures with reference to canned goods.

After the usual thanks by and to the Chairman and a short speech from W. S. Smedley, this last-of-the-season club dinner terminated.

Between the Public and your Product

It is important that your product be well dressed to meet its public—a good article deserves good "presentation". It is a matter of good business. Percy Boyden and Co., Ltd., of Rothermere Road, Waddon, Surrey, are specialists in all modern presentation-for-marketing wrappings, wax papers, pure vegetable parchments, glazed transparent paper (white, coloured, embossed), "Viscose" material (sheets, reels, or coils), shavings. They are particularly interested in wrappings for all food products.

They manufacture their own lines (including "Cellusca" Transparent Wrappings) and hold exceptionally large stocks, which enable them to guarantee specially quick service.

* * *

Chilled Beef from South Africa

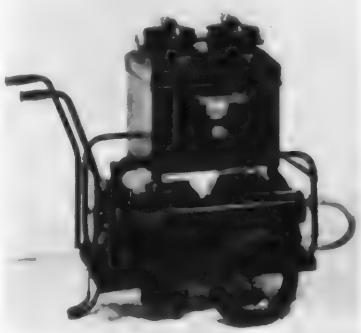
During the week ended April 16 last, 60 quarters, 983 fores and 1,023 hinds of chilled beef were shipped from South Africa to various ports in the United Kingdom.

* * *

New Technique in Insect Destruction

It has been found that the mist produced by the Phantomyst apparatus of André (Components), Ltd., is extremely effective in the destruction of insect life. When dealing with winged insects such as moths, mosquitoes, flies, wasps, etc., comparatively light concentrations of mist are required, the maximum amount depending on the type of insect to be destroyed and the nature of the insecticides used.

For insects of other kinds such as beetles, cockroaches, steam flies, bugs, crickets, etc., heavier concentration of mists are generally required, the exact amount of liquid in the form of mist which is necessary depending again on the insect and the type of insecticide. The table appended applies to the destruction of winged insects such as moths and flies using an insecticide having a density of about 0·8 and containing pyrethrum mixture or lethane.



A recent example of the application of the Phantomyst equipment occurred in a film studio where a large number of crickets were present under a "set" on which films were being made. The sounds made by these insects were so loud that they were picked up by the microphone and reproduced when the films were shown. A visit to the studio disclosed the fact that the crickets were located under a wooden stage about 18 inches high and of very irregular shape.

The mist from a suitable insecticide was introduced by a hose leading from the Phantomyser to a small trapdoor under the stage and an application of mist was continued for one hour. At the end of this time there were no further sounds from the insects, and an enquiry at the studio a fortnight later elicited the fact that there had been no further trouble due to the revival or return of the crickets.

Owing to the fact that the mist does not condense when used in the concentration necessary to destroy most insects, food products can be treated without affecting either their flavour or appearance and without the use of poison gas.

Phantomyst Type.	*Purpose.*	*Volume of Room or Warehouse. (Cubic Feet.)*	*Approx. Time Taken. (Minutes.)*	*Amount of Liquid Phantomysed per Hour. (Ounces.)*
A.1	Insecticidal	1,000	15	3 to 3¼
C.1	Insecticidal	10,000	60	5 to 6
D.1	Insecticidal	20,000	60	18 to 20
E.1	Insecticidal	40,000	60	40 to 45

INFORMATION and ADVICE

Canning Dried Peas—Brining Lemon and Orange Peels—Granadilla Juice—Custard Powder—Carbonated Tea

Canning Dried Peas

3,548. *As subscribers to your publication we would appreciate very much if you could give us any information or formulæ with reference to the process of canning dried peas.* (Malta.)

Briefly, the dried peas are soaked for about 12 to 24 hours, after which they are blanched in the usual blanching machines. They are then put in the cans, to which brine is added. The cans, after being exhausted and closed are sterilised, at 240° F. for a time, depending on the size of the cans.

Brining Lemon and Orange Peels

3,583. *How to brine lemon and orange peels, and the best method used in the manufacture of candied peel.* (South Africa.)

In reply to your request for the methods of brining lemon and orange peels, we would refer you to the following information which figures in a back issue of FOOD MANUFACTURE:

"The skins should be packed in layers in the cask. When full, close the cask and fill through the bung-hole with a saturated solution of pickling salt and 2 fluid ounces of SO_2 to each gallon of brine. Allow to stand for 24 hours, after which take out the bung and fill with brine. This will have to be done every 14 days, as the skins must be kept under the brine. Iron utensils should be avoided."

Some quite comprehensive information on candied peel manufacture appeared in the 1930 June issue of FOOD MANUFACTURE, and we could supply you with a copy of this at 2s.

Granadilla Juice

3,941. *We shall be pleased if you could give us any information concerning the sales and the price of granadilla juice in England.*

Granadilla juice and passion fruit juice are of the same species and very similar. The sale in this country is very small; it is purely a luxury article, since it is used chiefly as a base for cocktails. The cost of production in South Africa is five to six times that for grapefruit juice, and as the supplies of fruit available are small there is little prospect of the price falling. In this country it costs about 3s. 6d. per half-pint.

Custard Powder

3,926. *We shall be much obliged if you can give us a recipe for the manufacture of a good-class custard powder.*

We suggest that you experiment with the following recipe for custard powder:

Cornflour	14	lb.
Tapioca starch	10	,,
Custard colour	1	,,
Vanilla essence	½	,,
Essence nutmeg	¼	oz.

The essence, colour and tapioca starch should first be well mixed, and if necessary dried and ground to a fine powder. Finally, mix with the cornflour and sieve. The amount of colour depends upon the type used.

Carbonated Tea

3,918. *We wish to introduce carbonated tea beverages in our city during the hot months. We shall be very much obliged if you will kindly give us some help how to manufacture aerated tea and how much to be used in 10-oz. bottles.*

We have made extensive enquiries, but have been unable to trace any manufacturers of a concentrated essence that could be used in making aerated tea. You might experiment with a fairly strong infusion of tea and aerate this by the same methods that are used in aerating ordinary mineral waters.

Information Required

3,655. *The suppliers of a product known as "Fixoid", which it is said can be added to orange juice and permit heat treatment without change of flavour.* (Ontario.)

3,667. *Details concerning a butter flavour known as "Ferbo B" and whether it is similar to any other known butter flavour.* (London.)

Information Supplied

3,886. *Could you please give me the names of firms manufacturing machines for the extraction of tomato juice and other by-products?*

These names were given.

3,859. *Can you give us the names of any manufacturers in the U.K. of lemon and orange juice squeezing machinery? For squeezing in bulk and not for soda-water fountain.*

These names were given.

3,855. *Will you please let us have the name and address of "Tetley's Enamel"?*

The manufacturers of "Tetley's Enamel" are Messrs. Joseph Chater and Sons, Ltd., 785, Commercial Road, London, E. 14.

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NEW COMPANIES

Frank Avison, Limited. (339269.) April 13. Butchers and confectioners. £5,000. Permt. gov. dir.: F. Avison, 156, Kirkgate, Wakefield.

A. W. Brighton, Limited. (339226.) April 12. 20, Market Street, Watford, Herts. Bakers, confectioners, etc. £1,000. Dirs.: A. W. Brighton, 62, Durban Road West, Watford; Rowena M. Brighton.

Butter Candies (Treforest), Limited. (339078.) April 8. Mnfg. confectioners, etc. £2,000. Dirs.: D. J. Williams, Cleaves, Crediton, Devon; B. L. Daniel, 23, Colchester Avenue, Cardiff; D. L. Davies; D. Williams, 56, Park Place, Cardiff; T. Jeremy, Bryngwyn, Pontypridd; W. D. James, 89, Berw Road, Pontypridd.

"Chef" Peas, Limited. (338154.) 21.3.38. Wadsley Bridge, Sheffield. To take over the bus. cd. on at Sheffield by "Chef" Peas, Ltd. (in liquidation). £50 in £1 shares. Dirs.: Ella H. Gasking, Ranmoor Grange, Sheffield; F. L. Batchelor, Rowland Cote, Edale, Derbyshire; M. W. Batchelor, Brackenhurst, Abbey Lane, Sheffield; M. M. Dickson, Cotswold, Bramhope, Yorks. Remun. of dirs.: As voted by the company.

Docter Bros., Limited. (339130.) April 9. 78, Armour House, St. Martin's-le-Grand, London, E.C. 1. Dried fruit and pulp mchts. and salesmen, etc. £1,000. Dir.: J. P. Docter, 35-37, Bedford Place, London, W.C. 1.

King Fruits, Limited. (339098.) April 8. 53, Woodstock Road, Golder's Green, London, N.W. 11. Farmers. £2,000. Permt. dirs.: H. S. Minns, 16, Coningsby Gardens, London, E. 4; T. H. Durrant, 53, Woodstock Road, London, N.W. 11; S. Watts, 43, Park Avenue South, London, N. 8.

Manley's Food Products (North Shields), Limited. (339447.) April 20. Mnfrs. of and dlrs. in potato crisps, sauces, pickles, etc. £525. Dirs.: G. C. Barber, 37, Percy Park Road, Tynemouth; E. Gray, 77, Princes Street, North Shields; J. Gray, 29, King Edward Road, Tynemouth; F. J. Manley, Priors House, Priors Terrace, Tynemouth.

Melitex (1938), Limited. (339199.) April 11. Mnfrs. of and dlrs. in confectionery, etc. £3,000. Dirs.: L. S. Fraser, 9, Norfolk Court, Hagley Road, Birmingham; I. I. Jones, Rearsby, Clevedon.

Thomas Bros. (Bow), Limited. (339161.) April 9. 8-10, Beale Road, Bow, E. 3. Cowkeepers, dairymen, etc. £2,000. Life dir.: H. L. Thomas, 10, Beale Road, Bow.

J. White Smoked Salmon Specialists, Limited. (339382.) April 19. Fish mchts., etc. £2,000. Life dirs.: I. B. White, 100, Holland Road, N.W. 10; J. White, 226, Evering Road, N. 16.

The above-mentioned particulars of new companies recently registered have been extracted from the daily register of Messrs. Jordan and Sons, Ltd., company registration agents, Chancery Lane, W.C. 2.

TRADE MARKS

This list of Trade Marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The "Trade Marks Journal" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.)

AKBA. — 584,798. **Tea, coffee, cocoa, chocolate, and chicory.** JOSEPH TETLEY AND CO., LTD., 49, Mansell Street, London, E. 1. May 4.

ST. BERNARD BRAND. — 584,233.

Essential oils and essences (not alcoholic and not medicated), all prepared for use as ingredients in food. H. E. DANIEL, LTD., Dunster House, Mincing Lane, London, E.C. 3. May 4.

Registration of this trade mark shall give no right to the exclusive use of the words "The Mark of Quality".

CENOVIT. — 578,527. **Preparations of yeast for use as food for human consumption.** MARGARET RIPPENGAL, 23, Bedford Street, London, W.C. 2. (Associated.) (By Consent.) May 4.

CLEVITA.—584,458. **Flour.** THE CLEVELAND FLOUR MILLS (THORNABY), LTD., The Mill, Thornaby-on-Tees. May 4.

ELNUM.—584,619. **Poultry for use as food.** HENRY CHARLES BEALES, Rookery Farm, Little Ellingham, Attleborough, Norfolk. May 4.

EULOGY.—584,741. **Substances used as food or as ingredients in food.** HOVIS, LTD., 154, Grosvenor Road, Westminster, London, S.W. 1. May 4.

EXVOL.—584,087. **Edible oils and edible fats.** THE SOUTHERN OIL CO., LTD., Westinghouse Road, Trafford Park, Manchester. May 4.

GLODENBESS. — 582,577. **Butter.** DANISH BACON CO., LTD., 9-13, Cowcross Street, West Smithfield, London, E.C. 1. (By Consent.) April 13.

ITAMIN.—584,800. **Substances used as food or as ingredients in food.** ITAMIN MILK CO., LTD., 107, Leadenhall Street, London, E.C. 3. May 4.

KITBIS.—584,544. **Cereal foods.** WEETABIX, LTD., Weetabix Mills, Burton Latimer, Kettering, Northamptonshire. April 27.

KRISCAL.—584,435. **Biscuits.** BEATTIES BISCUITS, LTD., Drumchapel Biscuit Works, Glasgow. April 27.

LADY BOUNTIFUL. — 584,599. **Substances used as food or as ingredients in food.** COMPTON AND DAVISON, LTD., Hibernia House, 52-54, Southwark Street, London, S.E. 1. May 4.

MEADOWBROOK. — 575,827. **Cream cheese.**

CREAM PRODUCTS, LTD., 1a, Yorkshire Grove, Stoke Newington, London, N. 16. May 4.

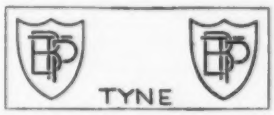
NUTROVA. — 583,446. **Malted milk for food.** HENRY WALSH (PRODUCTS), LTD., Apex Mills, Randal Street, Blackburn. April 27.

SUNDOX.—582,888. **Substances used as food or as ingredients in food.** LEO ROEDELHEIMER, Kuhlwetterstrasse 20, Düsseldorf, Germany. (By Consent.) May 4.

SUNWAFE. — 584,438. **Bread.** EMIL NORDBY, Vangsvein 51, Hamar, Norway. April 27.

SUPRYMA. — 584,370. **Canned hams.** LOVELL AND CHRISTMAS, LTD., 12, West Smithfield, London, E.C. 1. April 13.

TYNE.—584,302. **Substances used as food**



or as ingredients in food. THE SHIELDS ICE AND COLD STORAGE CO., LTD., The Shields Preserving Works, Fish Quay, North Shields. (Associated.) April 27.

Registration of this trade mark shall give no right to the exclusive use of the word "Tyne".

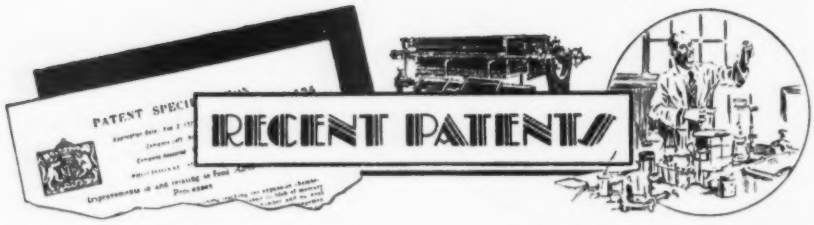
VIBIXA.—584,545. **Cereal foods.** WEETABIX, LTD., Weetabix Mills, Burton Latimer, Kettering, Northamptonshire. April 27.

WOLF BRAND. — 583,895. **Fresh fruit.**

DENNIS KIRKBY RICHARDS, Inghams, Little Blakenham, near Ipswich. April 13.

578,809.—**Sauce.** BRAND AND CO., LTD., Mayfair Works, 72 to 84, South Lambeth Road, London, S.W. 8. (Associated.) February 23.

580,527.—**Substances used as food or as ingredients in food.** ALEXANDER CLARKSON, trading as J. and A. Clarkson, Pretts Mill, Lanark, Scotland. December 1.



These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Latest Patent Applications

10669. CHIVERS AND SONS, LTD., and FISON, F. J.: Metal containers, etc. April 7.

10711. DALENIUS, V. R. A., and NYSTROM, J. L.: Salmon-slicing machines, etc. April 7.

10828. BEAVER, A. E. A.: Production of compositions for making gravy. April 8.

10870. CONTINENTAL SOYA CO., LTD.: Edible emulsions. April 8.

10871. CONTINENTAL SOYA CO., LTD.: Edible emulsions. (Cognate with 10870.) April 8.

11063. DIETZ, J. P. M.: Apparatus for rendering meat tender. April 11.

11401. ELECTROLUX, LTD.: Preservation of foodstuffs. April 13.

11520. LYONS AND CO., LTD., J. (DE MOWBRAY AND GRIDLEY): Manufacture of tea. April 14.

11529. ZIMMERMAN, B.: Process for purifying beet-sugar juice. April 14.

11691. DALIN, D.: Apparatus for conditioning grain. April 19.

11791. PERSOONS, J., and PERSOONS, A.: Centrifuge for separating cream, etc. April 19.

11792. PERSOONS, J., and PERSOONS, A.: Centrifuge for separating cream, etc. (Cognate with 11791.) April 19.

11820. KODAK, LTD. (EASTMAN KODAK CO.): Process of high-vacuum distillation of vitamin D, etc. April 20.

11883. RAMESOHL AND SCHMIDT AKT.-GES.: Clarification of molasses. April 20.

11920. DAVIS, G. J.: Manufacture of foodstuffs, etc. April 21.

12094. TRZOSKA, F.: Preservation of fruit juices, etc. April 22.

12283. MENEUX, C., BOURDIN, S. G., and CHAUSSE, L.: Separation of garlic from cereal grains. April 12.

12565. LEOT, G.: Manufacture of egg substitutes. April 25.

12598. DE DANSKE MEJERIES MASINFABRIK AND M.B.A.: Pasteurising apparatus. April 27.

12310. BRITISH ARCADY, LTD., and MAIDEN, A. M.: Production of soya flour, etc. April 25.

31170. AKTIEBOLAGET G. AREHNS MEKANISKA VERKSTAD: Devices for filling containers. (Sweden, November 14, 1936.)

31261. GOODLASS, WALL AND CO., LTD.: Containers for packages.

31587. MATHER AND PLATT, LTD.: Canning of dried peas.

Complete Specifications Accepted

480,803. HOLDEN, LTD., R. W., and LEUVENBERG, E.: Employment of hydraulic moulding-presses in the canning of hams and like foodstuffs.

480,871. TRIGGS, W. W. (FABRIQUE LORRAINE DE LÉGUMES SECS DÉCORTIQUÉS L. CAHEN): Production and treatment of dried edible vegetable products such as dried peas, beans, lentils, and the like.

480,951. PHILLIPS, S. B., and WHITTAKER, A.: Chocolate or other edible confections.

481,045. AKTIESELSKABET DANSK GOERINGS-INDUSTRI: Producing yeast, especially compressed yeast, and spirit.

481,356. HILL, W. C.: Treatment of whole citrus fruit for the manufacture of food or beverage bases or beverages.

481,368. GINACA, A. A., and WEYLER, J.: Preservation of cereals, seeds, and other material subject to attack of parasites, insects, and the like.

481,619. INDUSTRIAL PATENTS CORPORATION: Methods of stabilising shortening, and the stabilised shortening resulting therefrom.

481,711. RAMESOHL AND SCHMIDT AKT.-GES.: Treatment of juices in centrifugal machines.

481,930. FUSION-MOTEURS: Centrifuges, particularly cream-separating centrifuges.

482,050. BUSCHMAN, N. H.: Serving device for cans.

482,069. PATENT CO., LTD.: Method for assisting the fermentation of yeast, more especially in dough.

482,237. HITCHCOCK, W.: Device for uncapping honeycomb.

482,587. KLEINERT, T.: Production of savoury snacks on a large scale.

482,635. PATENT CO., LTD.: Manufacture of a product similar to malt extract for use more particularly in assisting baking and in the fermentation trade.

482,759. CHERRY-BURRELL CORPORATION: Methods of pasteurisation.

482,819. BELOIT IRON WORKS: Horizontal press roll assembly for paper-making machines.

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

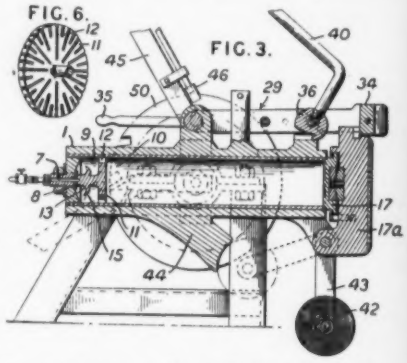
Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

472,466. **Puffing cereals, etc.** PLEWS, W. J.

Apparatus for the treatment of cereals and like materials with fluid under pressure, and the sudden release of such pressure, comprises a cylindrical chamber 1 for the material, closed at one end and open at the other. The cylinder is carried on trunnions, through one of which a supply of fluid passes to a pipe leading to a passage 7 in the closed end of the cylinder, this passage terminating in radial passages 8. The chamber is divided into two parts 9, 10 by a member 11 having a large number of small openings 12 through it so as to cause the fluid to enter the chamber 10, in which the material is heated, in a diffused condition; the member 11 is mounted in or integral with a plug 13 formed with a deflecting surface 15 for the fluid issuing from the passages 8. The mouth of the cylinder is closed by a cover 17 carried by a head 17*a* pivoted to the cylinder, the cover being self-adjustable on the head. A yoke 29 eccentrically pivoted

FIG. 6.



on a bracket on the cylinder has a bridge piece 34 to engage the head 17*a* and to hold the cover tightly closed when a handle 35 attached to the eccentric pivot is raised. A cam block 36 actuated by a handle 40 serves to trip the yoke 29 when it is desired to release the pressure in the chamber and also to lock the yoke in holding position during the treatment. The movement of the head 17*a* when the pressure is released is cushioned by a roll of belting 42 supported by links 43, this belting being adapted to engage an abutment 44 on the cylinder. The cylinder is swung into loading, treating and discharging positions by a handle 45 having a latch 46 engaging in notches in a ring 50. The apparatus is stated to be particularly suitable for the treatment of cereals described in Specification 472,465.

475,568. **Milk preparations; ice-cream.** MILK PROCESSES, INC.

A milk product containing over 65 per cent. of butter fat in the dispersed phase, and which is to be diluted with a liquid such as water to give products resembling milk or cream or such as whipping cream, ice-cream, cream cheese, etc., is produced with a larger proportion of milk solids other than fat than is normally contained in such a product. The product may be obtained by adding milk solids other than fat in the form of evaporated or condensed milk or milk powder to the milk or cream from which the product is produced by centrifuging, or by first obtaining from the milk or cream a product with the desired fat content, heating it to above 100° F. to make it more fluid, and then incorporating the milk solids other than fat therein. In a further form the milk solids may be added in the liquid used to dilute the product of high fat content.